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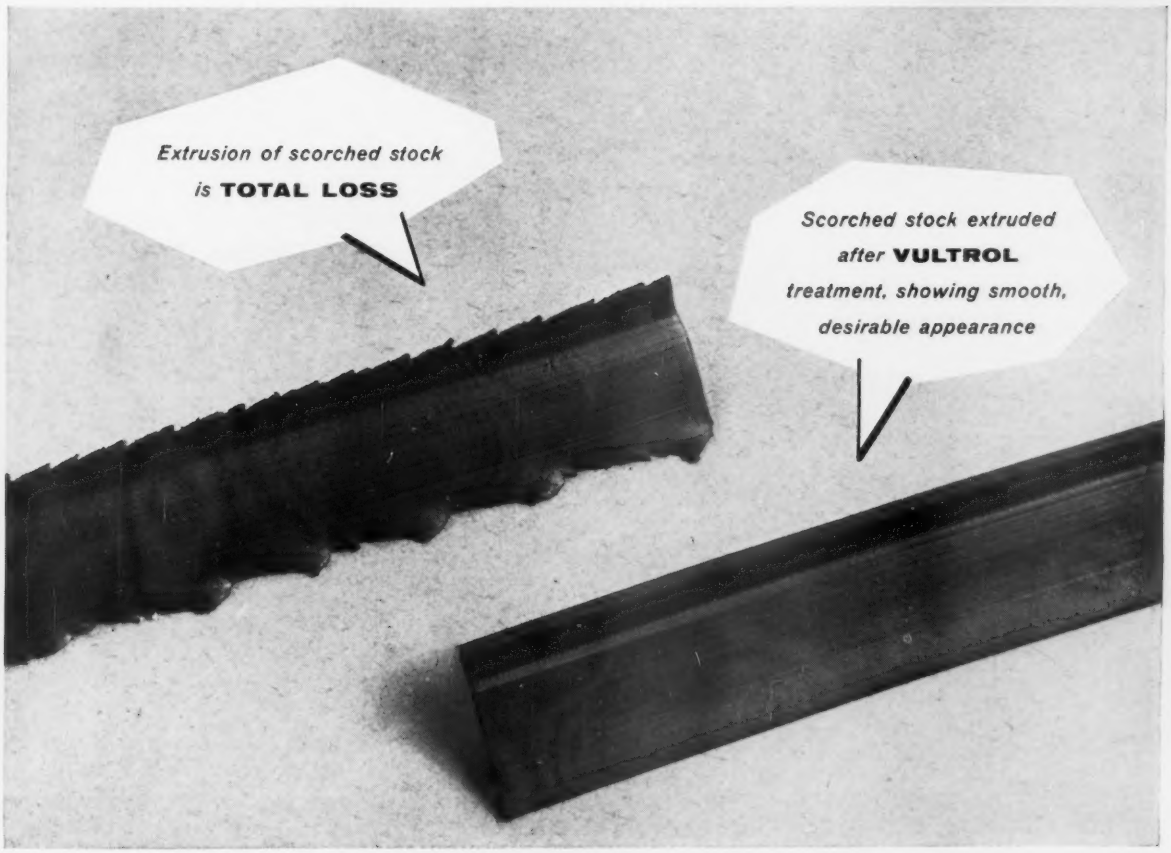

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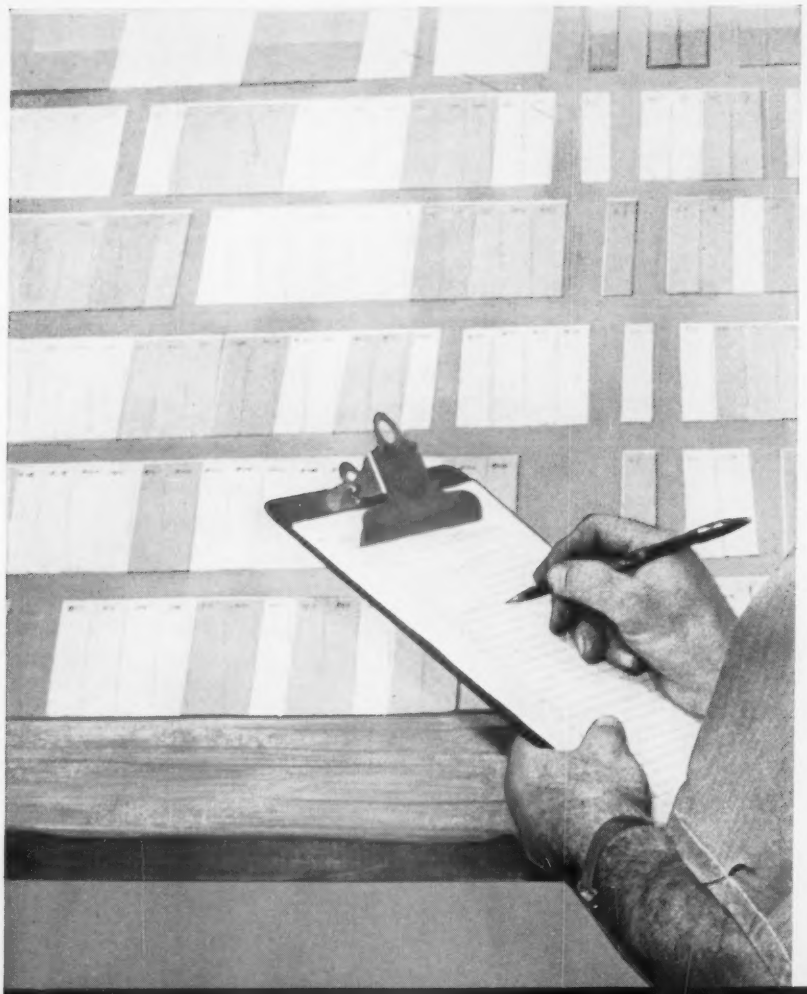

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JUNE, 1961 VOL. 89, NO. 3

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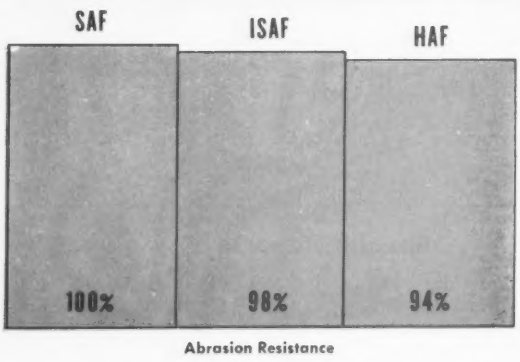

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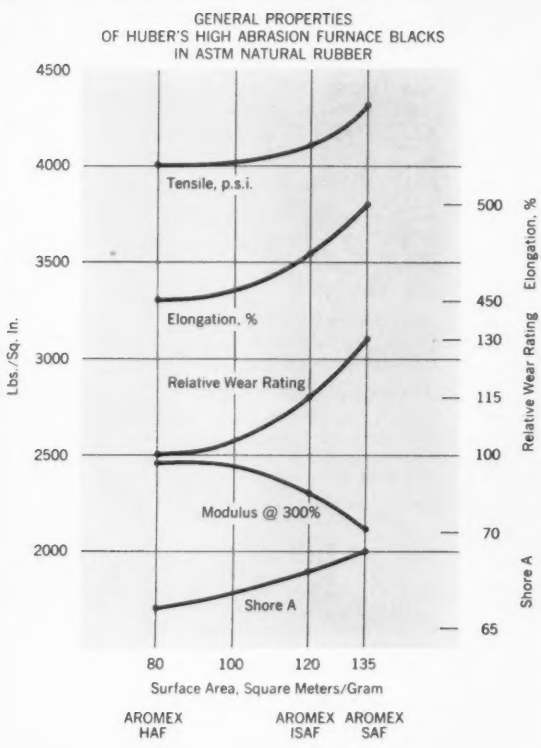

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Highlights Sidelights *of the News . . .*

June, 1961

Goodyear has developed a new process for making isoprene which makes possible the production of Natsyn synthetic rubber at a maximum cost of 25¢ per pound . . . Goodyear states that it can now produce isoprene at a cost equivalent or less than butadiene . . . It is noted that at the 25¢ level, Natsyn will be lower in price than natural (page 462).

Enjay Chemical has announced the commercial availability of Butyl rubber latex . . . The new material is said to be a chemical stable emulsion of butyl rubber in water containing approximately 55 per cent solids . . . The latex is said to be particularly suited for tire cord dipping in the manufacture of butyl tires (page 468).

Dr. Leslie Bateman, director of the Natural Rubber Producers' Research Association, in a special interview with RUBBER AGE editors, presents some interesting and pertinent comments on the status of the natural rubber industry, its current research activities, and what the natural rubber industry looks forward to in the future (page 464).

According to the Rubber Association of Canada, automotive products now account for two-thirds of the total value of rubber shipments by the Canadian rubber industry . . . In 1959, factory shipments of tires and tubes represented 53 per cent of the total value of all rubber industry shipments . . . In 1959, rubber consumption in Canada amounted to 101,475 long tons and this figure fell to 91,035 long tons in 1960 (page 490).

The United States Tariff Commission reports that synthetic rubber production in 1960 reached 2,952 million pounds, up slightly from the 2,825 million pounds produced in 1959 . . . Synthetic rubber sales in 1960 were valued at $698 million, up from 1959's $693 million (page 463).

Rubber Manufacturing Industry Plant Vacation Schedules . . . An annual service to the rubber industry and its suppliers indicating those companies which have announced vacation schedules during which time plants will close (page 476).

New York State officials have launched an investigation of possible antitrust violations in the purchase by the state of tires and tubes . . . Investigations have shown, it is said, the existence of identical bids from five major rubber companies in forty-five of forty-seven purchase categories (page 462).

coming events

June 23. Detroit Rubber & Plastics Group, Summer Meeting, Western Country Club, Detroit, Mich.

June 23. Washington Rubber Group, Annual Outing, Brooke Manor Country Club, Washington, D. C.

June 23-24. Southern Rubber Group, Buena Vista Hotel, Biloxi, Miss.

June 23-25. Northern California Rubber Group, Golf Outing, Cal Nevada Lodge, Lake Tahoe, Calif.

June 25-30. ASTM Annual Meeting, Chalfonte-Hall, Atlantic City, N. J.

June 27-30. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 3-7. Gordon Research Conferences, Polymers, Colby Junior College, New London, N. H.

July 17-21. Gordon Research Conferences, Elastomers, Colby Junior College, New London, N. H.

July 27-Aug. 1. International Symposium on Macromolecular Chemistry, Co-sponsored by the ACS Division of Polymer Chemistry and the IUPAC Commission on Macromolecules, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 4. Rubber Chemistry Division, Chemical Institute of Canada, Technical Meeting, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 10. New York Rubber Group, Golf Outing, Scotch Plains and Echo Lake Country Clubs, Scotch Plains and Westfield, N. J.

Aug. 18. Philadelphia Rubber Group, Golf Outing, Manufacturers Country Club, Oreland, Penna.

Aug. 28-Sept. 1. Gordon Research Conferences, Adhesion, New Hampton School, New Hampton, N. H.

Sept. 3-8. American Chemical Society, 140th National Meeting, Chicago, Ill.

Sept. 5. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Sept. 5-8. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

Sept. 9. Connecticut Rubber Group, Annual Outing.

Sept. 21. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Sept. 25-28. Industrial Building Expos'tion & Congress, New York Coliseum, New York, N. Y.

Sept. 28. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 3. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Wolverine Hotel, Detroit, Mich.

Oct. 10. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 10-12. American Standards Association, 12th National Conference on Standards, Rice Hotel, Houston, Texas.

Oct. 12. Northern California Rubber Group, Past-Presidents' Night, Berkeley, Calif.

Oct. 13. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16-20. National Safety Council, 49th Annual Convention, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Oct. 20. Joint Meeting of New York, Connecticut and Philadelphia Rubber Groups, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 3. Philadelphia Rubber Group, Fall Dance, Manufacturers Country Club, Oreland, Penna.

Nov. 7. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 16. Northern California Rubber Group, Technical Meeting, Berkeley, Calif.

Nov. 17. Connecticut Rubber Group, Technical Meeting.

Nov. 26-Dec. 1. American Society of Mechanical Engineers, Winter Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 1. Tenth Annual Wire & Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 2. Northern California Rubber Group, Christmas Party.

Dec. 7. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 8. Detroit Rubber & Plastics Group, Christmas Party, Statler Hilton Hotel, Detroit, Mich.

Dec. 8. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 9. Southern Ohio Rubber Group, Christmas Party.

Dec. 12. Buffalo Rubber Group, Christmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 15. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 15. New York Rubber Group, Christmas Party, Henry Hudson Hotel, New York, N. Y.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Feb. 5-9, 1962. ASTM Committee Week, Statler Hilton Hotel, Dallas, Texas.

Feb. 8, 1962. Fort Wayne Rubber & Plastics Group, Technical Meeting, Van Orman Hotel, Fort Wayne, Ind.

March 2-4, 1962. Boston Rubber Group, Ski Weekend.

March 20-29, 1962. American Chemical Society, 141st National Meeting, Washington, D. C.

March 23, 1962. New York Rubber Group, Spring Meeting.

April 6, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

April 26, 1962. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

June 7, 1962. New York Rubber Group, Summer Outing.

June 22, 1962. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 24-29, 1962. ASTM Annual Meeting and Apparatus Exhibit, Hotel Statler, New York, N. Y.

August 2, 1962. New York Rubber Group, Golf Outing.

Sept. 9-14, 1962. American Chemical Society, 142nd National Meeting, Atlantic City, N. J.

Sept. 30-Oct. 5, 1962. ASTM Pacific Area Meeting and Apparatus Exhibit, Hotel Statler, Los Angeles, Calif.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Cleveland Cleveland, Ohio.

Oct. 19, 1962. New York Rubber Group, Fall Meeting.

Nov. 25-30, 1962. American Society of Mechanical Engineers, Winter-Annual Meeting, Statler Hilton Hotel, New York, N. Y.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Roosevelt, New York, N. Y.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

May 4-7, 1965. Division of Rubber Chemistry, American Chemical Society, Fountainebleau Hotel, Miami Beach, Fla.

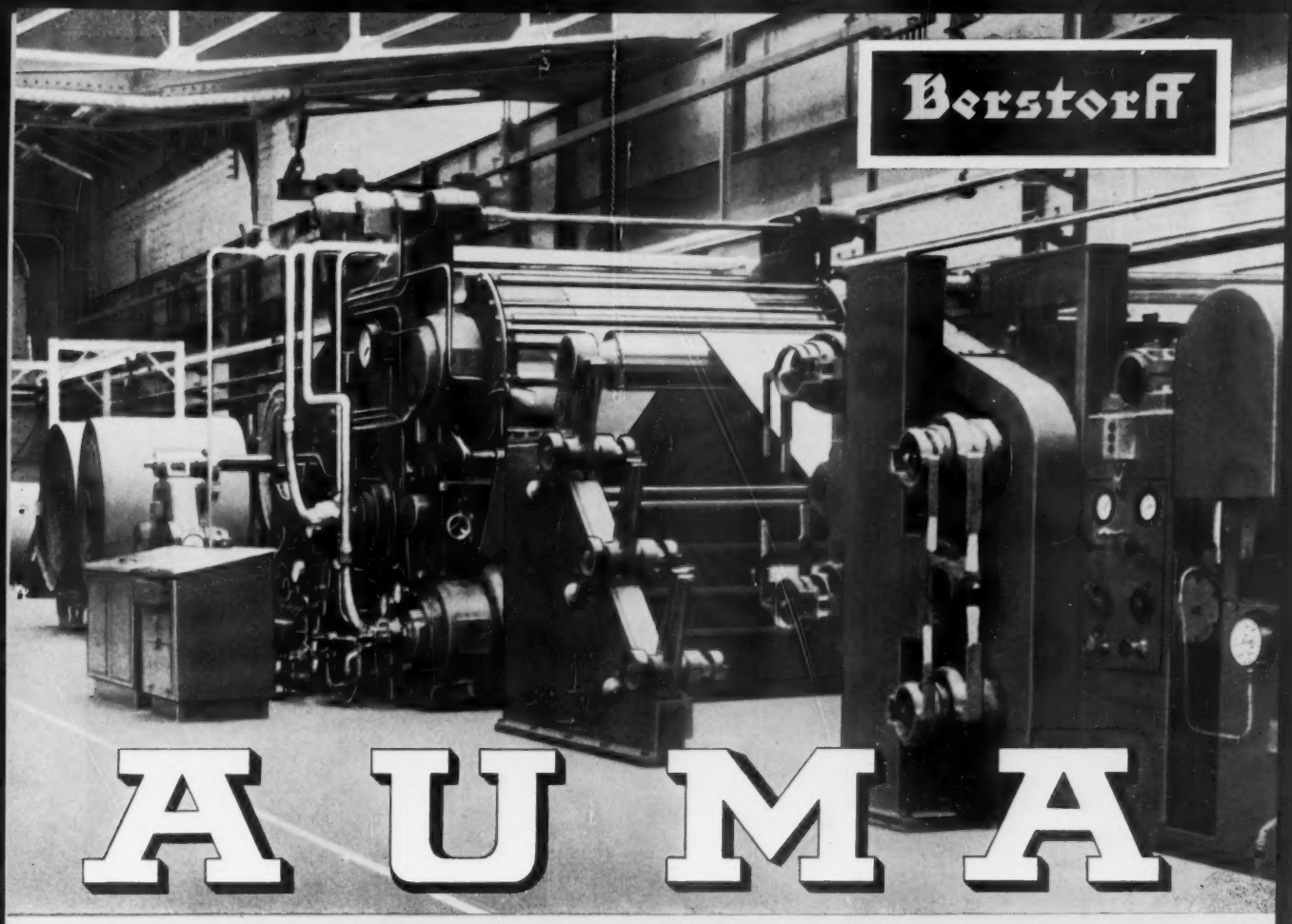
Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

Sept. 13-16, 1966. Division of Rubber Chemistry, American Chemical Society, New York, N. Y.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.



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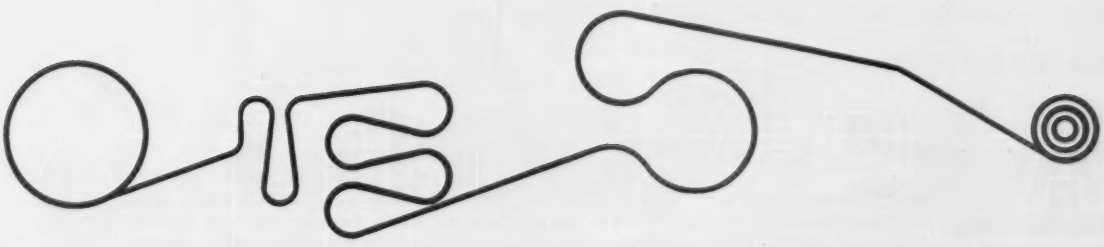

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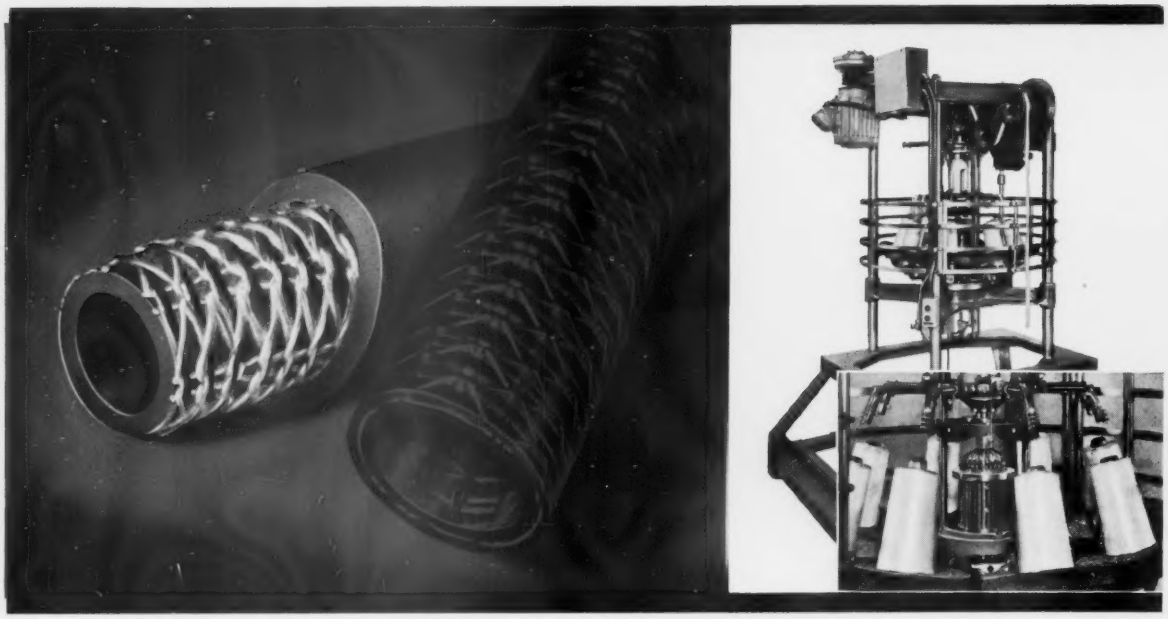

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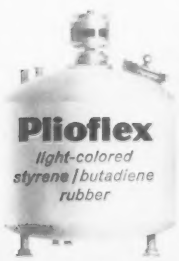

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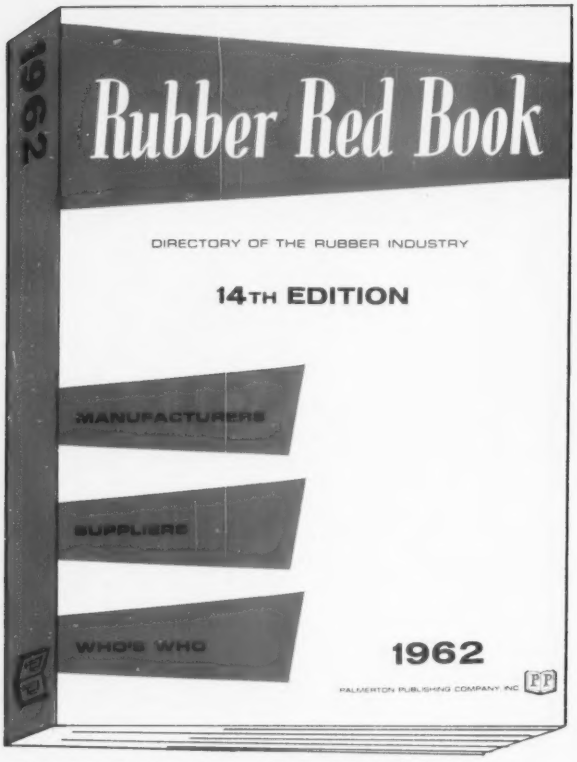

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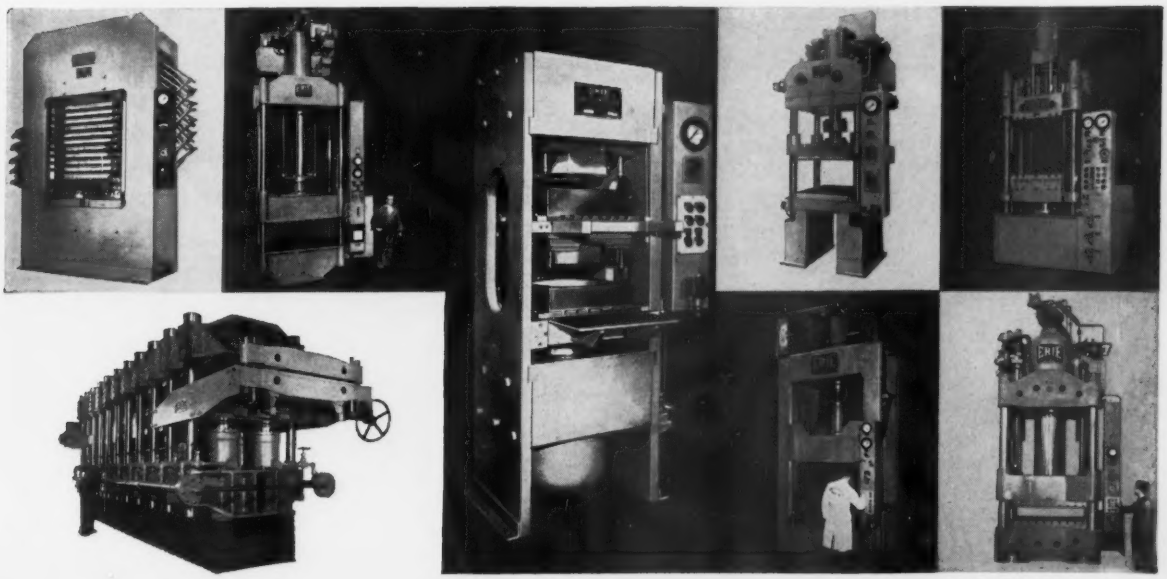
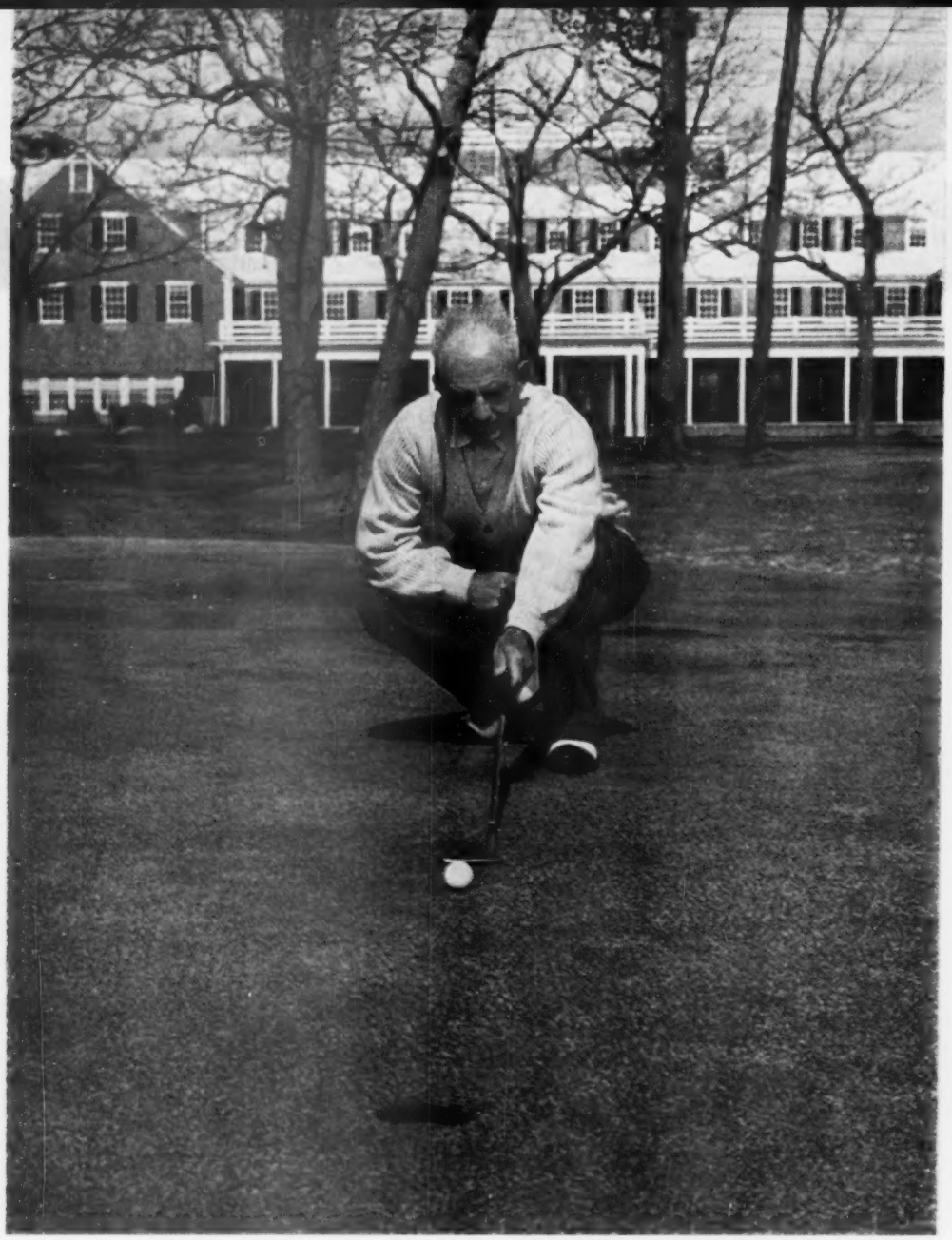


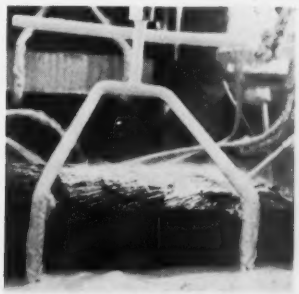


MEET BILL MAGUIRE – United Carbon district sales manager and par (?) golfer during his leisure hours.

In golfing, preparation for that last, all-important putt is as essential as for each shot that precedes.

In our business, the final touches before shipping each masterbatch bale are equally critical.

THE FINAL TOUCH



United Carbon sees to the final touches in producing its black masterbatch products. Here, a bale is passing through a uniform bath of talc slurry—it will then be dried.

After the masterbatch bales are dry, they are stacked for shipping. The talc prevents bales from blocking, allowing easier in-plant storage and use.

In keeping with its traditional eye toward details, United Carbon follows through all steps prior to shipment of black masterbatch products. Before palletizing, each BAYTOWN masterbatch bale is given a uniform coating of talc/water slurry which is then dried. The talc coating is held to a minimum. Bales are coated with just enough talc to ensure maximum shipping and handling ease.

When the talc has served its purpose, the bale can be thrown directly into a Banbury without further preparation. There is no time-consuming unwrapping necessary. And, further, the talc is completely compatible in rubber compounds. It does not contaminate.

United Carbon observes strict attention to details in black masterbatch production, right to "the final touch."

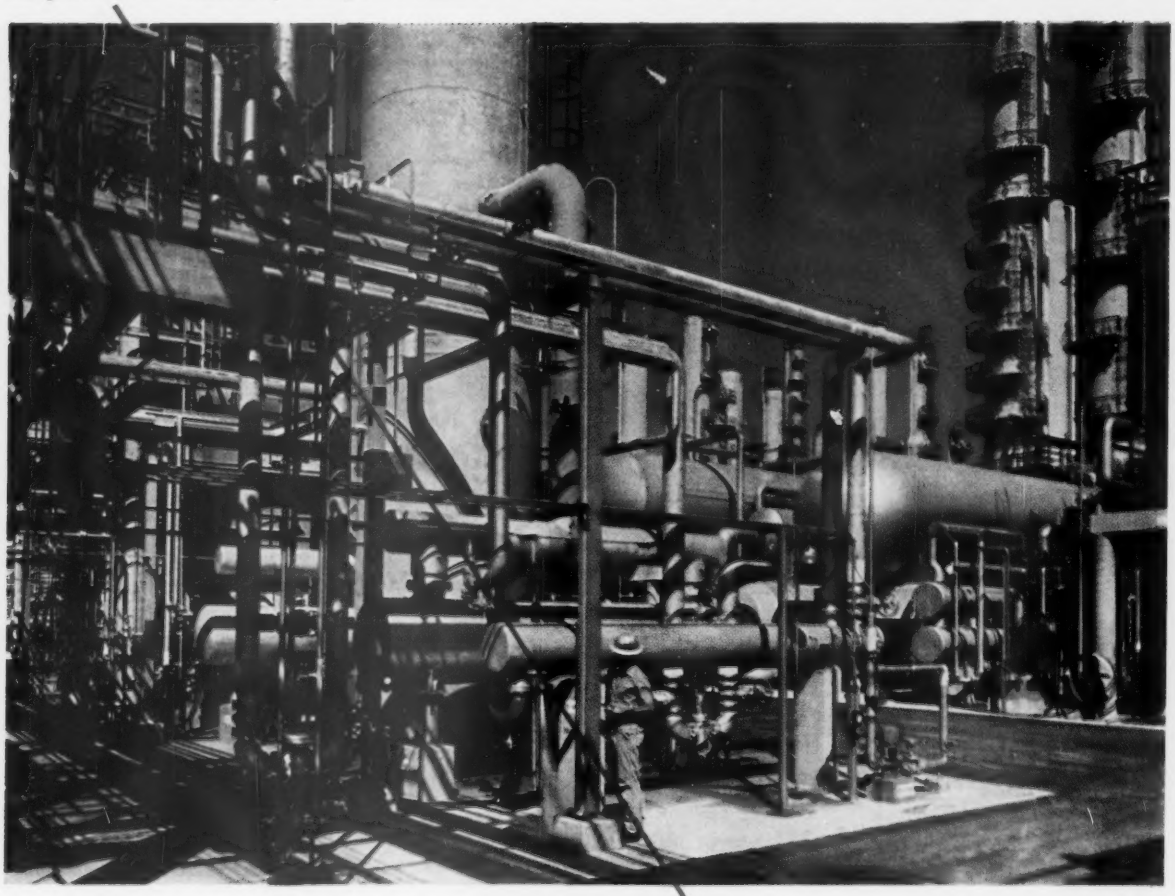
BAYTOWN – The Birthplace of Black Masterbatch

For more information about BAYTOWN black masterbatches contact:

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company
AKRON CHICAGO LOS ANGELES
BOSTON HOUSTON MEMPHIS
In Canada: CANADIAN INDUSTRIES LIMITED
In France: UNITED CARBON FRANCE, S.A.

UNITED CARBON

Important Quality Improvements in *Petro-Tex n-BUTENE-1*



Deliberate removal of undesirable olefins from our commercial production of Petro-Tex n-Butene-1 has resulted in a very substantial quality improvement over the past two years.

Petro-Tex n-Butene-1 is now being used by important linear olefin polymer producers. As a highly reactive alphaolefin, it undergoes a wide range of oxidation, hydration, alkylation and oxo-process reactions which commend further study of its use for n-butyl alcohol, butylene oxides as well as various copolymers and petro-chemicals.

We invite inquiries on Petro-Tex n-Butene-1 and

n-BUTENE-2 ISOBUTYLENE
BUTADIENE DIISOBUTYLENE TRIISOBUTYLENE
TETRAHYDROPHTHALIC ANHYDRIDE

PETRO-TEX CHEMICAL CORPORATION

8600 PARK PLACE BOULEVARD, HOUSTON 17, TEXAS

JOINTLY OWNED BY
FOOD MACHINERY AND CHEMICAL CORPORATION
TENNESSEE GAS TRANSMISSION COMPANY

Ameripol Rubber helps ball maker bounce back into competition

Intensified competition in selling sponge rubber balls inspired a thorough cost study by Barr Rubber Products Company. To help make it, they called in a Goodrich-Gulf sales engineer. A switch from natural rubber to an Ameripol synthetic rubber polymer really produced results. Barr was able to cut its raw material costs substantially. Quality of the end product is maintained at the same high level, and processibility improved. If you make or use rubber products, check Goodrich-Gulf. We produce the broadest range of synthetic rubber polymers, and offer complete technical service that can help you make improvements. Contact Goodrich-Gulf Chemicals, Inc., 1717 East 9th Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

WORLD'S LARGEST SOURCE OF SYNTHETIC RUBBER

NEWS FROM GOODRICH-GULF

NEW SYNTHETIC RUBBER CAN REPLACE NATURAL 100% IN HEAVY DUTY TIRES

Goodrich-Gulf is now proceeding with a multi-million dollar plant for the commercial production of Ameripol CB (cis-polybutadiene) rubber. CB is the only known polybutadiene rubber which can be used as a 100% replacement for natural rubber in heavy duty tire treads.

In over 5 million miles of test driving on Ameripol CB tire treads, up to double the tread life of natural rubber has been achieved. Superiority is greatest in very severe conditions including heavy loading, long distances, and high-speed turnpike driving.

The first Goodrich-Gulf plant unit will produce at an annual rate of 20 million pounds. In addition, other companies will produce CB under license.

Ameripol CB has qualities which may be advantageous in applications beyond tires. Good electrical properties, abrasion resistance can provide superior coverings for electrical wires that are subjected to mechanical wear. Outstanding flex properties suggest superior performance in power transmission belting and conveyor belting.

This new development complements Goodrich-Gulf's production of Styrene-Butadiene Rubber (SBR) in non-pigmented hot, cold, and oil-extended types; and micro-black masterbatch cold, and cold oil-extended types.

Ameripol
THE PREFERRED RUBBER

PROCESSING COSTS CUT WITH NEW MEDIUM-LOW VISCOSITY SBR

Newest addition to the Ameripol SBR family, Ameripol 4604, has the combined features of a high bound styrene with a minimum-low raw Mooney viscosity in the range of 30 to 42.

The high bound styrene content, together with medium-low viscosity, results in a cold polymer with excellent processing characteristics. Time is saved, and need for peptizing agents is eliminated.

TYPICAL PHYSICAL PROPERTIES

(Based on test recipe of 100.0 parts Ameripol 4604, 40.0 parts EPC Black, 5.0 parts zinc oxide, 1.5 parts stearic acid, 2.0 parts Benzothiazyldisulfide, 2.0 parts sulfur).

Raw Viscosity, ML-4 @ 212°F.		40
Compound Viscosity, ML-4 @ 212°F.		51
	Cure @ 292°F.	
Tensile, psi	50′	3080
Elongation, %	50′	745
Modulus, 300%, psi	25′	310
300%, psi	50′	830
300%, psi	100′	1260

Light color, low viscosity, outstanding physical properties, and low water absorption qualify Ameripol 4604 for products such as:

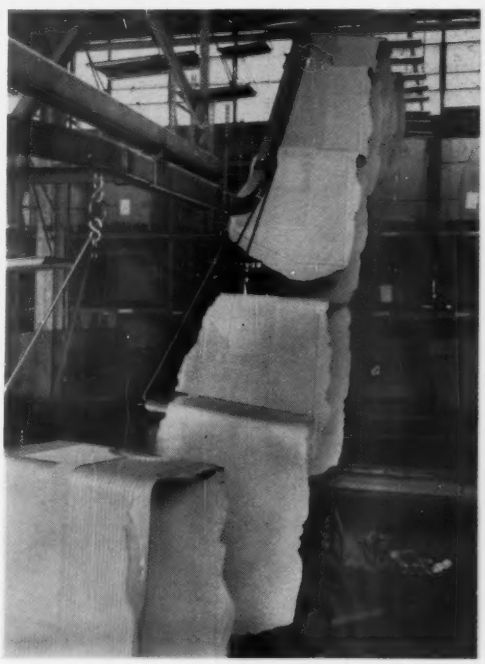
Closed Cell Sponge • Calendered Goods • Open Cell Sponge • Transfer Molded Items • Cements • Coated Fabrics • Adhesives • Hard Rubber

AMERIPOL 4700 CUTS FLOOR MAT COST

Each one of these automobile floor mats coming down the conveyor line at Anchor Industries, Inc., Cleveland, represents a savings over the previous rubber polymer used.

The mats are made from Ameripol 4700, which is a 50-part oil-extended rubber; thus costs substantially less than low-oil polymers. Ameripol 4700 maintains the high quality level this company has established; permits processing in a range of colors.

Since Goodrich-Gulf produces the broadest range of SBR polymers, we are in excellent position to help you in selecting the type which exactly meets your needs.



Goodrich-Gulf Chemicals, Inc.

1717 East Ninth Street • Cleveland 14, Ohio

Ameripol
THE PREFERRED RUBBER

YOU GET THE WIDEST SELECTION OF SBR POLYMERS FROM GOODRICH-GULF ...WITH TECHNICAL SERVICE TO HELP YOU IN PROPER APPLICATION

Ameripol NON-PIGMENTED RUBBERS

NON-PIGMENTED HOT RUBBERS

1000 Staining. General purpose rubber, easy processing, good aging, for wide range of molded and extruded products.

1001 Slightly staining. General purpose rubber, similar to Ameripol 1000, used where less discoloration is required.

1002 Staining. Similar to Ameripol 1000, exhibits more tack in processing.

1006* Non-staining. General purpose rubber for light colored and white products.

1007 Staining. Good electrical resistance properties. Reduced water absorption.

1009* Non-staining. Has little or no nerve in milling, used as a processing aid in other rubbers.

1011 Non-staining. Tackier in processing than Ameripol 1006, used in adhesives, tapes, molded and extruded goods.

1012* Non-staining. High Mooney 1006. Ideal for cement applications. Excellent flow characteristics and high green strength in compounded stocks. Used to increase tensile and hardness in non-black stocks.

1013* Non-staining. High bound styrene content provides greater thermal plasticity and excellent flow characteristics.

*Available in either bale or crumb form.

NON-PIGMENTED COLD RUBBERS

1500 Staining. General purpose cold rubber, better physicals, usually better processing than hot rubbers.

1501 Slightly staining. Similar to 1500, better resistance to staining and discoloring.

1502 Non-staining. General purpose rubber for light colored and white products.

1509 (formerly 4601) Non-staining. Coagulated with Alum making it suitable for low water absorption applications. A medium low viscosity polymer.

1511 (formerly 4600) Non-staining. For light colored and white products. Good physicals on aging. Fast pigment incorporation. Reduced Mooney viscosity.

4604 Non-staining. High bound styrene polymer which is extremely suitable for sponge work, both open and closed cell. Has good processing characteristics.

NON-PIGMENTED OIL-EXTENDED RUBBERS

1703 Non-staining. General purpose 25-part naphthenic oil-extended polymer.

1705 Staining. General purpose 25-part aromatic oil-extended, improved processing and aging.

1707 Non-staining. General purpose where higher oil, 37½-part, can be used. Contains rosin acid for extra tack.

1708 Non-staining. 37½-part oil-extended, highly resistant to discoloration and stain.

1710 Staining. Similar to 1705, higher oil level. Easy processing, excellent physicals at lower cost.

1712 Staining. 37½-part oil-extended, superior processing.

4700 Non-staining. 50-part oil-extended, for greatest economy.

Ameripol MICRO-BLACK MASTERBATCH RUBBERS

MICRO-BLACK MASTERBATCH COLD TYPES

1605 Non-staining. Easy processing extrusion polymer with 50 parts of FEF black also suitable for manufacture of high quality molded goods.

1606 (formerly 4659) Staining. 52 parts of HAF black and 10 parts of HA oil. Used sucessfully for retreading.

1608 (formerly 4664) Staining. A quality tread rubber consisting of 52 parts of ISAF black and 12.5 parts of HA oil.

1609 (formerly 4667) Staining. This SAF Micro-Black can be used to an advantage in applications requiring high abrasion resistance; premium quality products can be made from this polymer. Made of 40 parts SAF black and 5 parts HA oil.

1610 (formerly 4660) Staining. 52 parts ISAF black and 10 parts HA oil. High abrasion resistance suitable for tires camelback.

4651 Staining. 62.5 parts of HAF black and 12 parts of HP oil. Used in camelback tires and mechanical goods.

MICRO-BLACK MASTERBATCH COLD, OIL-EXTENDED TYPES

1805 Non-staining. A low cost general purpose rubber of 75 parts HAF black and 37.5 parts N oil.

1808 Staining. This 75 parts HAF black and 50 parts HA oil polymer is very suitable for camelback and low cost molded and extruded goods.

1809 Staining. 75 parts HAF black and 37.5 HA oil. Applications include tires, camelback and mechanical goods.

4756 Staining. Intermediate loading of black and oil produces quality tread stocks. Contains 75 parts HAF black and 37.5 parts A oil.

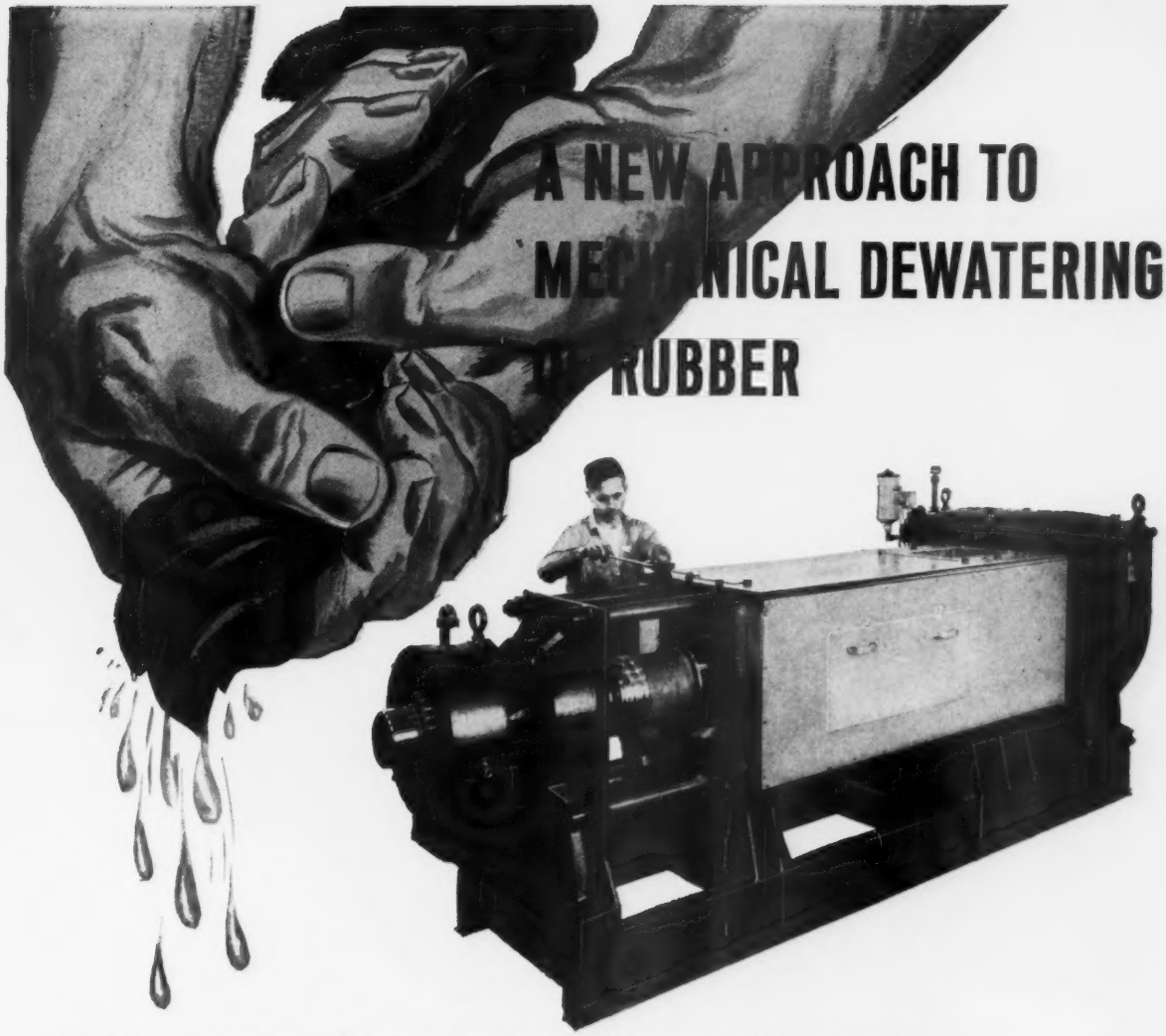
4758 Staining. A low cost tread rubber consisting of 82.5 parts of ISAF black and 62.5 parts of HA oil.

4759 Staining. 75 parts ISAF black and 37.5 parts A oil. Applications include high quality camelback and tires.

For service in the preferred rubber call...

Goodrich-Gulf Chemicals, Inc.

Cleveland: 1717 East Ninth Street • Phone: TOwer 1-3500
New York: 200 East 42nd Street • Phone: MUrray Hill 7-4255
Chicago: 6272 West North Avenue • Phone: NAtional 2-3722



A NEW APPROACH TO MECHANICAL DEWATERING OF RUBBER

EXPELLER* DEWATERING PROCESS

Mechanical dewatering of rubber by the new Expeller process has aroused the interest of many rubber companies. Following years of research the process has now been industrially accepted and in use for over a year. In fact, major companies are now using a number of these Expellers, preceeding dryers, to take moisture in crumb from 65% to as low as 8%. In actual use, the capacity of drying equipment can be increased two to four times when preceded by an Anderson Expeller. Based on such performance, each of these companies have ordered additional units.

EXPELLER DEWATERING HAS THESE ADVANTAGES

- Increases Drying Capacity
- Agglomerates Minute Crumb particles
- Improves Carbon Dispersion
- Saves on Drying Equipment
- Reduces Dryer Dust
- Dewaters all Types of Natural or Synthetic Rubber

A Pilot Plant in the Anderson Laboratory has dewatered almost every type of synthetic and natural rubber by this Expeller process with excellent results. These data are available to rubber companies. Pilot Plant demonstrations on your product can be arranged.

*Trademarks reg. in U. S. Pat. off & Foreign Countries

THE V. D. ANDERSON COMPANY
1963 West 96th Street • Cleveland 2, Ohio

Gentlemen: We are interested in the Expeller Rubber Dewatering Process. Would you please provide us with additional data.

We are processing (type of synthetic or natural rubber)_____

_____

Name _____ *Title* _____

Company Name _____

Address _____ *City* _____ *State* _____

THE V. D. ANDERSON COMPANY
Division of International Basic Economy Corporation

No loose black
No bulk oil
No unpigmented rubber

Gentro-Jet®

assures savings in shipping, storage and handling

You can save many ways with Gentro-Jet, General Tire's steam-whipped SBR-carbon black masterbatch. Shipped on neat, easy-to-handle skids, Gentro-Jet takes less floor space and eliminates the problems of loose black, irregular bales of rubber and drums of oil stacked for use.

Gentro-Jet is ready for the banbury—ready to help *you* increase profits, product quality and plant efficiency. Write for details and valuable literature today.

Gentro-Jet Black Masters offer:
Increased tire tread life • Faster proccessing
Cleaner in-plant operation • Selection of types to meet your needs

Creating Progress Through Chemistry

Chemical Division GENERAL
THE GENERAL TIRE & RUBBER CO.

THE GENERAL TIRE & RUBBER COMPANY
CHEMICAL DIVISION • AKRON, OHIO

Chemicals for the rubber, paint, paper, textile, plastics and other industries: **GENTRO SBR** *rubber* **GENTRO-JET** *black masterbatch* • **GEN-FLO** *styrene-butadiene latices* • **GEN-TAC** *vinyl pyridine latex* • **GENTHANE** *polyurethane elastomer* • **ACRI-FLO** *styrene-acrylic latices* • **VYGEN PVC** *resins* • **KURE-BLEND** TMTD *masterbatch* • **KO-BLEND** *insoluble sulfur masterbatch*

Shell's SP-103 and SP-102 come in crumb form, left, and bale form, right. Both contain predispersed resin to shorten mixings.

TIMESAVERS:

Shell Chemical now offers two resin-rubber masterbatches—in free-flowing crumb and solid bale form

Shell's SP-103 masterbatch contains equal parts of high styrene resin and low viscosity S-1509 rubber.

Shell's new SP-102 is identical except the rubber portion is S-1502.

Both are light-colored, nonstaining and nondiscoloring. They provide a convenient source of predispersed resin for nuclear and sponge soling, floor tile and hard rubber products requiring easy processing, flexibility and durability.

Read why these two polymers also reduce mixing time, minimize scorch hazard and eliminate resin handling.

Shell's SP-103 is made from equal parts of high styrene resin and low viscosity S-1509 cold rubber.

The high styrene resin content imparts properties such as abrasion resistance, gloss, stiffness and durability.

The cold rubber in SP-103 has a viscosity range of 30-38. This results in a uniform mixture when added to a low viscosity compound.

SP-103 is recommended for open and closed cell sponge and molded mechanical goods that require exceptional mold flow.

Higher viscosity SP-102

Shell's new SP-102 contains equal parts of high styrene resin and S-1502 cold rubber. This rubber has a viscosity range of 46-58.

SP-102 is recommended for nuclear shoe soling, floor tile—any hard rubber product that requires superior toughness and abrasion resistance.

Speeds processing

Why do these resin-rubber masterbatches reduce in-plant mixing time?

Because the resin is added at the latex stage. This means it is thoroughly blended when the rubber is delivered. Banbury masterbatching of resin and rubber is eliminated. So is the separate handling of resin.

Shell's SP-102 and SP-103 give maximum reinforcement in even the shortest mixing cycles. And there is less danger of scorch as a result of shortened mixings at lower temperatures.

Now in two forms

Both masterbatches are now available in either free-flowing crumb or 75-lb. bale form. The crumbs are packaged in 50-lb. multiwall bags. Bales can be shipped in multiwall bags or film-wrapped in clear polyethylene.

How to order

For additional information and technical specifications on SP-103 and SP-102, call a Shell Synthetic Rubber Division sales office. Locations are: Stamford, Conn. (DAvis 5-1581), Cleveland, Ohio (EDison 3-0600) and Lakewood, Calif. (SPruce 3-4997).

Shell Chemical Company

SHELL

Synthetic Rubber Division

capitol cues

THE BUSINESS UPTURN IS NOW PICKING UP SPEED. You can see this quite clearly in steel and auto output, industrial production generally, new home starts, and consumer incomes. By the end of the second quarter, total output of goods and services will be up measurably from the start-of-the-year low. Economists think the improvement will add $10 billion to the rate of output.

> The rate of recovery will accelerate in the second half--with step-ups in hiring, consumer buying, business investment, and government spending. Conservative estimates put the gains in total output in the second half at another $15 billion. A growing minority, though, expects more--maybe $25 billion.

THE RECOVERY WILL DEVELOP INTO A FULL-SCALE BOOM IN 1962 even if the more conservative estimate for the next six months is the one proving out. This year's gains will generate the preliminary momentum. Currently rising sales will soon be clearing out inventory and encouraging plant expansion. And rising incomes will prepare the stage for a spurt in consumer spending.

> Much of the push next year will come from consumer purchases of durable goods--autos, appliances, furniture, and homes. This has been a slack area for several years now. But the need to replace so many items and the formation of many new families will swell demand. Further, people are upgrading their desires--two cars, air conditioning, color TV sets.

BUSINESS ABROAD IS ALREADY BOOMING, in contrast to the slack here. Industrial output is high and still rising. Unemployment is generally low. Exports are strong. Things are so good that inflation is a potent threat. Canada is about the only major exception to this trend. It is closely tied to U.S. developments. The number of jobless is high, while output is down.

> Essentially, the booming times are a world-wide phenomenon.
> -In Europe, business is rolling in France, West Germany, Italy, and Holland. British output is high, but exports are off.
> -In Latin America, business is up in Argentina, Mexico, Peru.
> -In the Far East, the Japanese are making prodigous gains. India and Pakistan are gaining in agriculture and industry.

CORPORATE PROFITS ARE TURNING UP this quarter, according to early reports. Company nets will look much better than those of January-March. There are two reasons for this outlook. One is improved sales prospects. The other is the progress that many companies have made in slashing costs.

> First tabulations show that most lines suffered substantial declines from 1960 during the opening quarter of this year.
> -Increases were racked up by utilities, finance and banking, petroleum, office equipment, and non-rail transportation.
> -Declines were registered in chemicals, coal, drugs, steel, paper, railroads, autos, machinery, and building materials.

capitol cues (cont'd)

PRICES OF RAW MATERIALS ARE ON THE RISE these days, for the most part in response to improving business. Prices will be up 2%, over-all, by year-end. But the gains will vary considerably, from line to line. In some cases, the increases will be slow to start--showing up, to begin with, in disappearance of special concessions. (This may be what happens in steel.)

-Metals: Look for gains of 1% to 1½% as production goes up.
-Scrap: Rising metal output--and exports--will lift costs 5%.
-Lumber: There'll be hikes of 4-5%; inventories are down.
-Other building materials: Gains averaging 2½% are foreseen.
-Farm products: Prices this Summer will be up 1% over 1960.

CONGRESS WILL REWRITE KENNEDY'S TAX PROGRAM this year to fashion it along lines that business would prefer. Congressional tax experts believe some key items will be killed outright. Others will be altered considerably. Indeed, the changes may be so sweeping that the President will veto the bill.

Liberalized depreciation to spur investment, is the core of Kennedy's program. He wants to allow a tax credit to firms that step up capital spending. But industry wants formulas that give a break to all--not just those that lift outlay. And Congress seems certain to endorse the latter approach.

The outlook for other key sections of Kennedy's tax program:
-Repealing the dividend credit: This one is considered too touchy, politically, to get through the House or Senate.
-Withholding taxes on dividends: There's little controversy over this one, but it will pass only as part of a big bill.
-Taxing foreign income as earned: Congress will refuse to end the deferral of taxes on income kept abroad by U.S. firms.
-Cracking down on expense accounts: There's little objection but lawmakers doubt whether workable rules can be drafted.

YOU MAY SEE SOME TOUGH LABOR NEGOTIATIONS this year, say government labor experts. They expect union demands to stiffen as compared with 1960. With one eye on the recovery, union leaders want to make up for lost time. But, with improvement only starting, industry can't pay big benefit hikes. Many firms say they will take a strike before they let labor costs inflate. Autos, railroads, farm equipment, and meatpacking will be key trend-setters.

Unions are now counting on better breaks from the National Labor Relations Board. For one thing, Kennedy has made two appointments which give the Democrats a majority; the new men are fair but "friendly." For another thing, some recent Supreme Court decisions clipped the Board's powers in cases involving union activity aimed at forcing workers to join.

SMALL FIRMS WILL GET MORE PENTAGON BUSINESS under a program that's being drafted by Defense Secretary McNamara. He hopes to earmark a bigger share of the rising arms budget for companies of eligible size. Altogether, nearly a half-billion dollars more in contracts will be set aside. Quotas are being specified for each service and procurement unit. Procurement officers are being told to keep an eye out for new opportunities for small outfits. Prime contractors are being pressed to give more work to smalls.

UNITED® ROLLS

for processing RUBBER · plastics · paint · tile · linoleum and other non-metallic materials

Making *precision* processing rolls is in many ways an art. Huge as these rolls may be, they require manufacturing skills as delicate as a watchmaker's.

United engineers, metallurgists and roll makers are continually improving the skills they developed more than 50 years ago when they became craftsmen in the manufacture of processing rolls. Leakproof drilled-type rolls—engineered and designed for maximum heat transfer rate—are among the many United roll achievements.

Wherever nonmetallic materials are processed, you will probably see the products of United's craftsmanship doing their *precision* job.

UNITED

ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH 22, PENNSYLVANIA

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington.
SUBSIDIARIES: Adamson United Company, Akron, Ohio.
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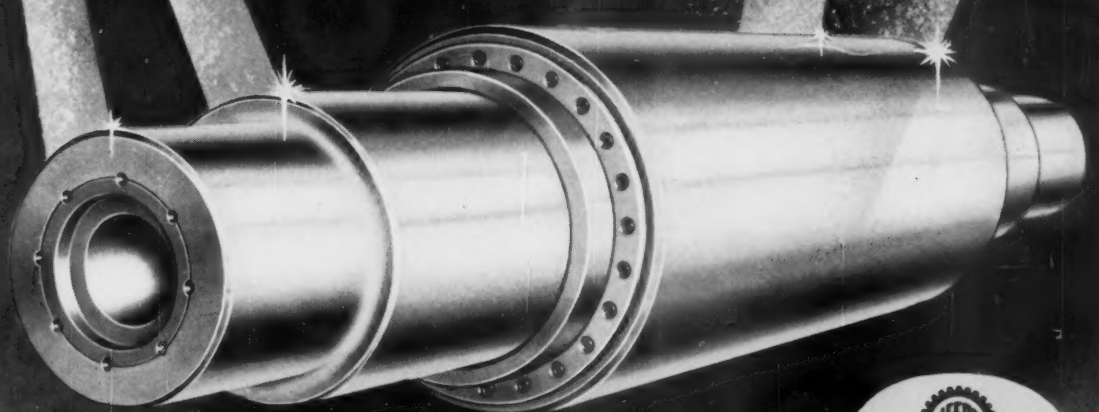

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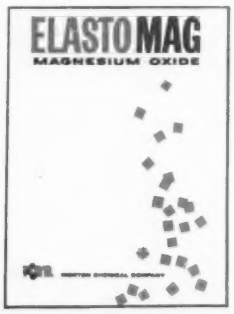
Progress...Leadership United for Sixty Years

ELASTOMAG
MAGNESIUM OXIDE

Three activity grades give you ideal process safety for every type of recipe

Cut down on costly throw-away loss caused by scorch. Get better bin stability . . . better states of cure by using an *activity-controlled* ELASTOMAG oxide from Morton. Three precision activity grades of ELASTOMAG—170 (high), 100 (medium), and 20 (low)—let you choose the oxide with a Morton Activity Index (MAI) that's ideal for every stock. New ELASTOMAG Micro-Pellets eliminate dusting problems. No binder or treating agent is used. In the mixer, Micro-Pellets break down to minute particles . . . provide the same superior dispersion as ELASTOMAG in the powdered form.



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Trenton, New Jersey

Photo courtesy of Chicago Rawhide Company

4,400,000

MILES*

* That's how far we've gone (in actual road test tire miles to date) to prove that the new Cabot REGAL oil furnace carbon blacks are nothing less than revolutionary in boosting performance and lowering costs.

WHAT THE 4,400,000 TIRE MILE TEST PROVES ABOUT THE NEW REGAL BLACKS

REGAL 300: it outperforms premium-priced channel blacks – and it doesn't cost as much

Regal 300 provides rubber properties virtually identical with those of premium-priced channel blacks, but with the faster curing rates of furnace blacks. It is an ideal lower cost replacement for channel black, offering the additional advantage of the economies of oil furnace manufacture. And, in both car and truck tire road tests, it has actually outperformed channel blacks in resistance to wear and tear, cracking and chipping.

REGAL 600: it combines new properties – better traction

This is a totally new type of oil furnace black developed by Cabot to give low hardness and low modulus in passenger car tire treads and tread rubber for a quieter ride and superior traction. Road tests prove it combines these features with excellent tread wear resistance. Its unusual combination of fine particle size and very low structure is a property never before available in oil furnace grades. It has been tested in cold SBR, oil-extended SBR and natural rubber and it offers interesting product improvement possibilities not available from either gas-produced or other oil furnace blacks.

REGAL SRF: it has two big advantages over gas-produced SRF

Regal SRF matches gas-produced SRF in performance. Thorough laboratory and plant testing shows it is interchangeable with gas-produced SRF, giving equal physical properties and processing characteristics. Yet, unlike gas-produced SRF, Regal SRF offers two important advantages because it is made from oil: 1) More convenience for carbon black users the world over, since it can be produced at locations where there is no natural gas and is commercially available from both domestic and overseas Cabot plants. 2) Price will not be affected by constantly rising costs of natural gas because Regal SRF is made from oil. Regal SRF is available at local currencies, meaning overseas users need no longer import SRF in exchange for U. S. dollars. The result: greater convenience in ordering, faster and more efficient delivery.

CABOT REGAL BLACKS ARE NOW IN PRODUCTION AND AVAILABLE WORLD-WIDE — ANOTHER STEP IN CABOT'S CONTINUING PROGRAM TO GIVE YOU BETTER SERVICE, BETTER PRODUCT PERFORMANCE, AND ADDED ECONOMY.

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Printed in U.S.A., June, 1961

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Single Opening Belt Press for vulcanizing rubber belting. Press is equipped with hydraulic stretcher and clamping units mounted at the ends of the moving platen. Press capacity is 3,180 tons. Size of heating platens is 63¼" x 30'0". Maximum working pressure is 2,250 psi. Other sizes available. Send for full details without obligation.

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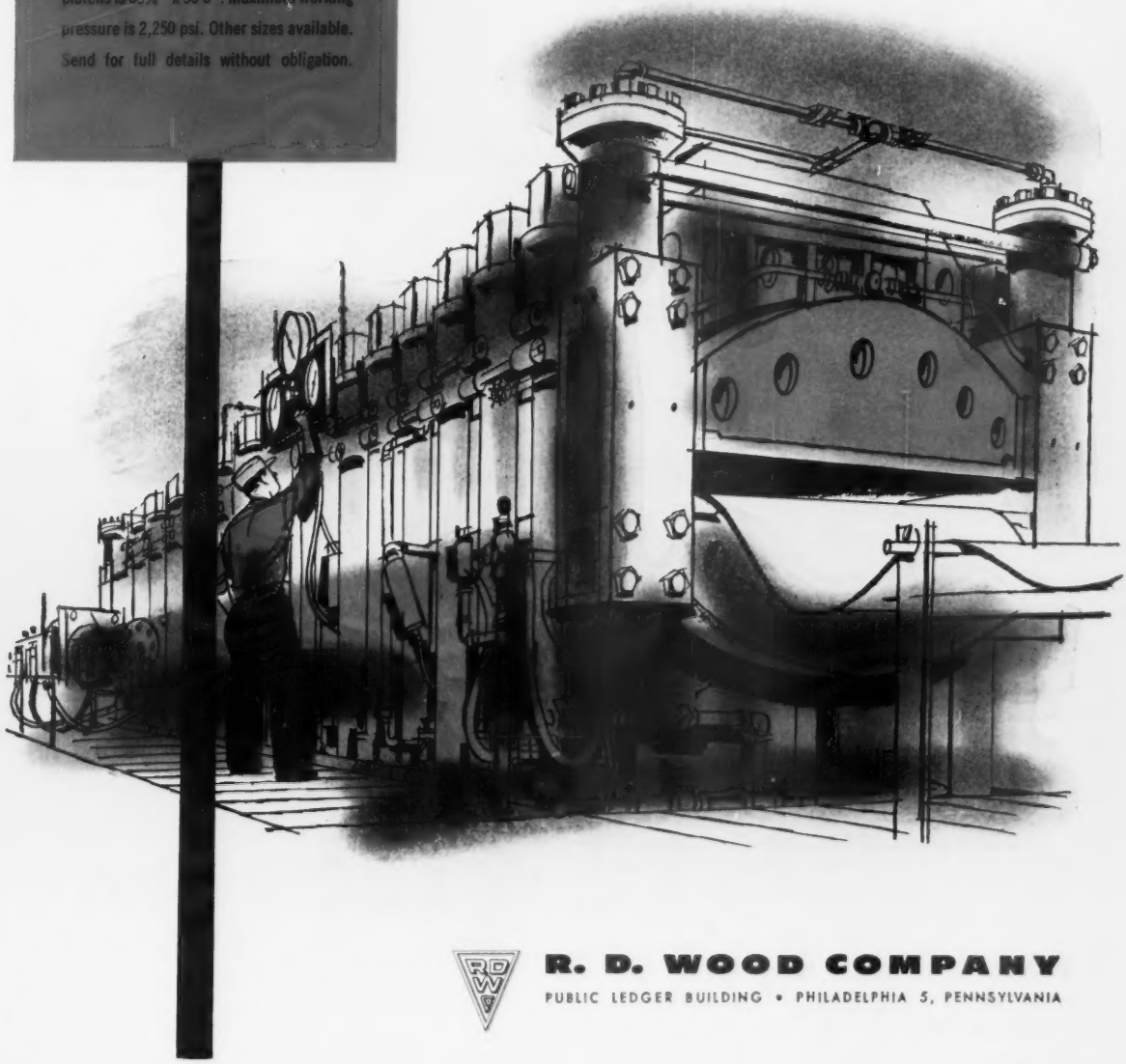

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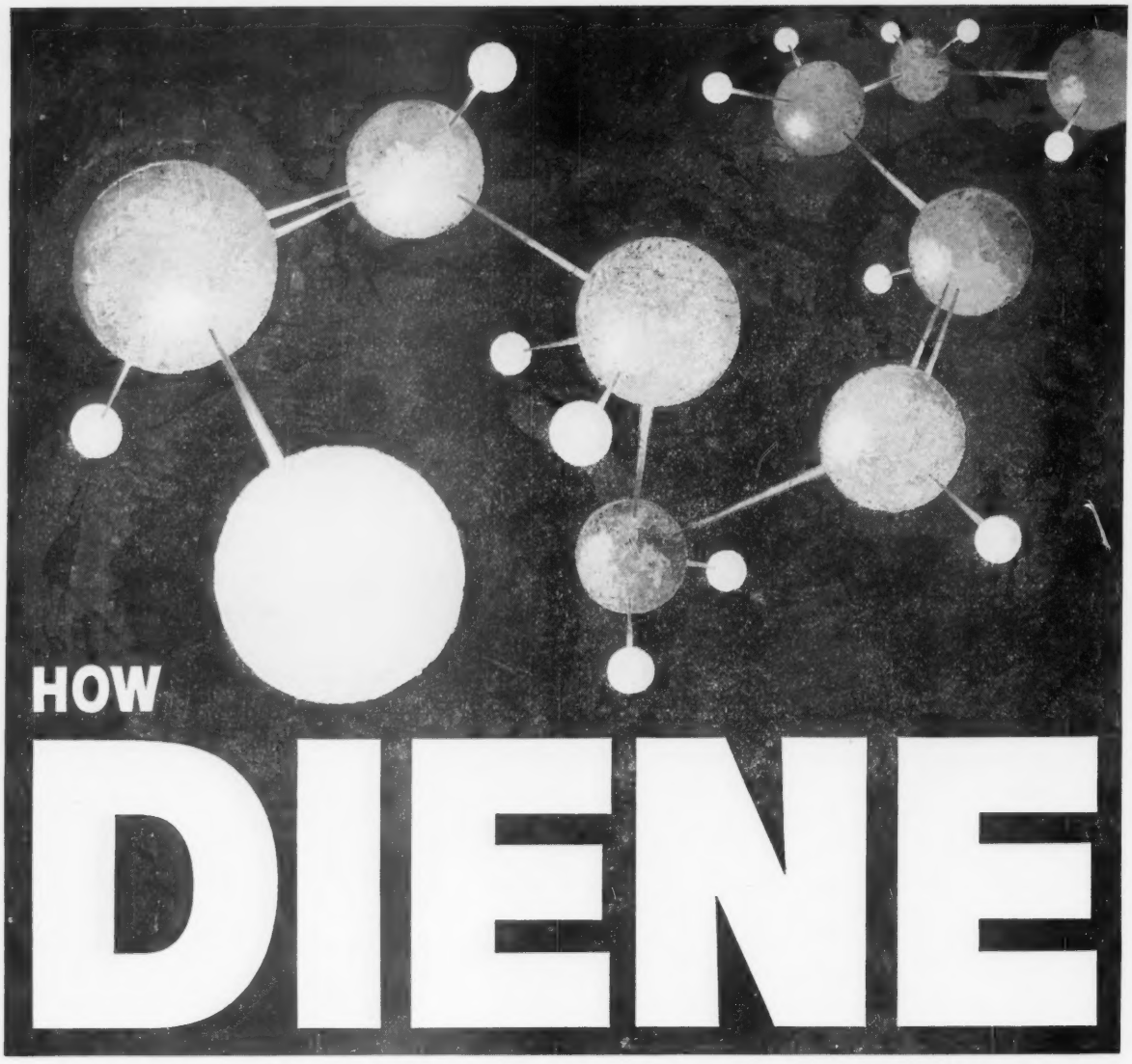

HOW DIENE

UNLEASHES NEW FORCES IN THE RUBBER MOLECULE

Before Diene*, when you added any given polymer to rubber it was like adding 2 + 2. The result was always 4.

That's why Firestone's dynamic new Diene is so significant. Many chemists and compounders are finding that rubber and Diene are making 2 + 2 = 5!

They're finding that Diene rubber, when mixed in major proportions with natural rubber or Styrene-Butadiene rubber, lends remarkable new qualities to the resultant compound. Qualities that expand and excel the best features of both, synergistically. Such payoffs as 20% more resiliency than natural rubber, for example, and greater resistance to wear, heat, cracking and aging all result.

Diene unleashes new forces in the rubber molecule and uncovers new potentials for rubber products!

Take truck tires as an example. Multi-million-mile road tests involving tires with Diene-natural rubber compounds have shown greater wear resistance. Lower operating temperatures. Improved road grip on slick surfaces. Better gas mileage through reduced rolling resistance.

Moreover, Diene will improve many *other* rubber products—from rubber soles to conveyor belts.

You'll want to learn more about this outstanding research achievement. Write for development quantities and technical information to: Dept. 23-3, Firestone Synthetic Rubber and Latex Co., Akron 1, Ohio.

Firestone's Diene rubber plant is in full commercial production.

Firestone

SYNTHETIC RUBBER & LATEX CO.

AKRON 1, OHIO

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As Ken Soule Sees It

by Kenneth J. Soule

Shoe Soles

In the matter of shoe soles, as in so many other items, things seem to move in cycles. At one time, leather had a practical monopoly of the shoe sole business. Then rubber and/or plastics gradually moved in, and for a number of years have dominated the field. In 1960 for example, leather soles were used on only about 28 percent of the shoes manufactured in this country.

However, according to a recent article in *Industrial and Engineering Chemistry*, leather is now strengthening its position in the shoe sole field by a new and novel approach. This involves the treatment of leather soling material with various rubber solutions. It has been known for several years that butyl polymers dissolved in volatile solvents and impregnated into leather gave much improved wear, as well as better oil and chemical resistance. The process did have a number of drawbacks, including the hazards of flammability and toxicity of the solvents used, and the considerable time required for the treatment.

Now, a naval research leather chemist, Milton Bailey, has just been granted a U.S. patent (No. 2,967,165), which not only eliminates these difficulties but also produces a product of superior quality. According to Mr. Bailey's method, two parts of butyl polymer and three parts of rosin are dissolved in hot paraffin. In the case of high molecular weight polyisobutylenes (such as regular Butyl rubber or Vistanex), these are best milled into the paraffin before the mixture is heated. In either case, the leather soles are dipped or tumbled in the 150°F. bath, where they have a quick pick-up of from 22° to 40° F.

The resulting leather is said to be twice as wear-resistant as that made by the butyl-solvent method, which itself has shown up well in extensive tests on the two toughest types of service—the military, and children's shoes. Thus it appears quite possible that leather—aided and abetted by special reinforcement with butyl polymers—may give other rubber and plastic shoe soles a real run for their laurels! This would be a sort of oblique follow-through on the old adage, "If you can't lick 'em, join 'em!"

A clever cartoon, which appeared recently in "Rubber and Plastics Weekly," would furnish a very fitting footnote to this discussion. Since we cannot reproduce the sketch, however, we shall attempt to describe it. The drawing shows a vastly oversize shoe, fitted up as a cozy home, with doors, windows, window boxes, shutters, and even a TV aerial. Two old ladies, outside the house, are conversing. One —who very well might be the "old lady who lived in the shoe," remarks to her friend, "They didn't put expanded rubber-resin foundations in these old shoes—the damp plays hell with my rheumatics!"

Toot-Toot-Tootsies

With so many companies turning out vast quantities of urethane foam, there have been some fears expressed that a serious over-supply might result. These misgivings should be considerably reduced by the introduction of a new item made of urethane foam, and designed to promote female pulchritude.

As described in "Chemical Progress," the contrivance consists of a series of pads, which are used to separate milady's dainty toes while she applies nail polish to each and every tiny toe-nail. The pads, or cushions, called "Pamperettes," are described as ". . . the latest contribution to fastidious grooming techniques." It is also claimed that they ". . . spring back into petal-freshness after a quick sudsing."

So, thanks to the ladies, one segment of the rubber industry should be able to quit worrying about at least one part of its multitude of problems.

Rubber and Maple Sugar

Strangely enough, natural rubber and maple sugar do have certain things in common. Both are derived from liquids secured by tapping living trees and, in each case, the problem is to get rid of excess, unwanted water. From this point on, any similarity between the two products disappears—solid rubber being produced from rubber latex by coagulation, while securing maple syrup from maple sap involves removal of excess water by continued boiling. Later, it will be shown that certain rubber and rubber-like articles assist greatly in the processing of maple syrup and maple sugar. But, for the moment, we shall leave rubber and concentrate on the maple products.

Basically, maple syrup and maple sugar are made the same way they were seventy-five years ago—by boiling down sap. However, when all of the present-day steps involved in the complete operation are studied, we find that many, many, changes in procedure have taken place. As Murray Hoyt points out, in a delightful article in *Today's Living* entitled "Sweet Steam," mechanization is definitely the order

of the day. Thus, tractors have replaced oxen as sled motive power, and plastics have largely superceded hand collecting methods.

For instance, instead of buckets under each tree tap to catch the sap, the modern method may employ closed plastic bags or plastic tubing. In the case of tubing, most of the trees will be connected to the pipe system, thus carrying the sap directly from the source to the sugar house storage tank. The saving in labor and material is obvious. Mr. Hoyt mentions that when plastic tubing was first used it was "plain-" (neutral colored?). On cold nights the sap would freeze in the line, thus slowing up the flow until the ice thawed out. Some ingenious operator painted black lines the length of the tubing, which caused faster warming up from the morning sun and quicker melting. (A neophyte in the art wonders what would happen if black plastic tubing were used throughout.)

Since about thirty-nine gallons of water have to be boiled away as steam to produce one gallon of maple syrup, a lot of fuel is consumed in the process. Many operators use oil burners under their evaporators, but many others still use slab wood—when they can get it. However, wood is hard to come by these days, particularly since even the trim is used in paper making and other conversion industries. One odd type of fuel which is readily available and which makes a very hot fire is scrap automobile and truck tires! These are said to be quite satisfactory as a substitute for wood, although offhand it would seem that the aroma of burning rubber would hardly lend much piquancy to the basic "sweet steam" odor. Still, the smell of the fuel doesn't affect the taste or color of the finished syrup, and those are the things which are of prime importance.

So, although rubber and maple syrup do not really have too much in common, it appears that manufactured items made of both rubber and plastics do play a considerable part in the production of the good maple syrup and maple sugar which we all love so well! If you wonder why an early Spring item like maple syrup should be appearing now, the answer is that in the New York area, Spring was very late this year, (and just possibly—I was even a little later).

Racing Tires

The present world's speed record for motor driven automobiles stands at slightly less than 400 miles per hour. As all racing fans know, this figure represents the average speed developed in two passes (once in each direction) over a meticulously measured mile course.

In 1898, when European racing bodies first officially recognized such a record over a standardized mile track, the figure established was approximately 40 m.p.h. From that time on, the magic number gradually rose to 103 in 1904, and then to a breathless 203 miles per hour. The latter mark was set at Daytona Beach in 1926 by the late Sir Henry Seagrave in his famous 1000 h.p. "Sunbeam."

Two years later Ray Keech (an American), pushed the Daytona figure up to 207 m.p.h., driving a White-Triplex. In 1935, Sir Malcolm Campbell reached the 300-mile goal (301.1292) and captured the title once more for England. It has remained in British hands ever since, being held successively by Capt. G. E. T. Eyston, John Cobb, Capt. Eyston, and finally, in 1947, by John Cobb again at 394.196 m.p.h.—where it now stands. All of these British runs were made at the Bonneville (Utah) Salt Flats.

Since 1929, incidentally, all tires used in these record-breaking British runs were built by the Dunlop Rubber Co. Ltd. As A. R. Smee points out, in a most informative article in *Rubber Developments*, such "tyres" are distinctive in a number of ways. They stand four feet, four inches high, with a seven-inch cross section. The tread is perfectly smooth, (no tread design whatever), and is approximately 1/50 of an inch thick.

To withstand the terrific stresses set up at speeds of 400 to 500 miles per hour, the tire carcass is said to be fabricated of Fortisan rayon. The extra strong bead wires are locked against the split-wheel rims by a solid rubber spacer, re-enforced with steel wires.

All of the tires in question, as well as the inner tubes employed, are the combined result of long and intensive investigative programs, both on the road and in accelerated tire machine tests. It is emphasized that all of the rubber used in the racing tires themselves has been "natural and not man-made rubber." The reasons given for this choice are the superior resilience and consequent lower heat build-up of natural rubber.

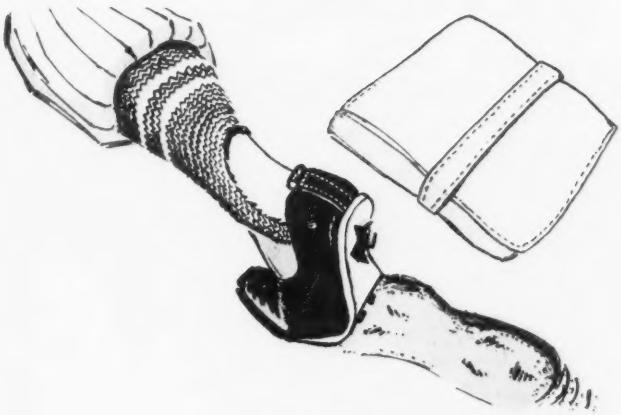
A recent entry into the tire field—polybutadiene—may ultimately change this situation, since some of its sponsors allege that blends of polybutadiene and crude rubber ran 15 to 20 degrees cooler than similar compounds of all natural rubber. However, in view of the development time required for racing tires, it's safe to say that any new one-mile speed marks, at least those set in the next few years, will be made by cars rolling on natural rubber tires.

Tea-ing Off—Then and Now

The following item from the New Jersey Bell Telephone's "Tel-News," illustrates rather well how styles and customs change, even in food habits.

"Except for high society, tea was pretty much unknown in early Colonial America. As it became more available, folks weren't too sure what to do with it. One solution was to boil the leaves until they became soft, throw away the liquid, butter and salt the leaves and serve them as 'greens'."

a message for suppliers



MISSED!

Sometimes you go through all the motions and still miss. Happens in sales, too.

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That's when advertising pays off. It's there whenever your prospect is. Good, sound advertising, inserted in those publications read by your customers and prospects, takes up the slack. It's pitching for you all the time, adding prestige and supporting the efforts of your sales staff, and, most important, reaching those influential people your salesmen never see and perhaps don't even know.

Then, to add the final touch that many successful advertisers use, mail out reprints of your ad, together with a special little message, to your complete prospect list. A number of advertisers, without such lists, use the special list that RUBBER AGE makes available to contract advertisers.

That's touching all the bases.

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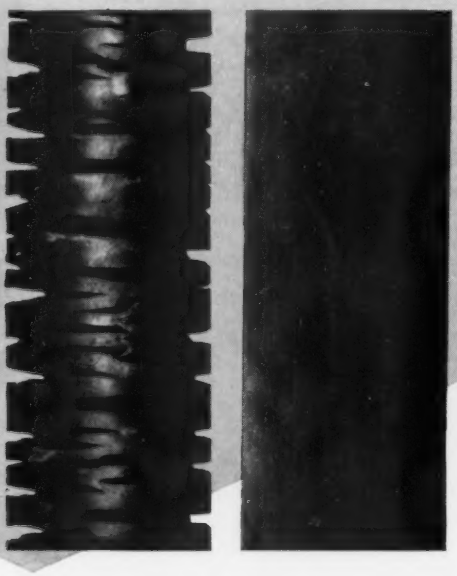
how to vastly increase the useful life of rubber...

Effect of Curing System on Antiozonant Retention in SBR Stocks after Vulcanization

(All contain 3.0 phr UOP 88; 40.0 phr HAF black)

Compound	Accelerator	Sulfur, phr	% Extractable Antiozonant
1082....	2.0 phr benzothiazyl disulfide	2.0	66.4
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1087....	None	2.0	~100.0
1088....	1.0 phr benzothiazyl disulfide	3.0	74.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1089....	1.0 phr benzothiazyl disulfide	1.0	88.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1084....	1.0 phr N-cyclohexyl-2-benzothiazole sulfenamide	—	—
1093....	1.0 phr diphenylguanidine	2.0	~18.0
1085....	2.0 phr tetramethylthiuram disulfide	—	35.0
1090....	4.0 phr tetramethylthiuram disulfide	—	12.9

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 187 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.

CONSIDER THE EFFECT OF YOUR CURING SYSTEM ON THE EFFECTIVENESS OF A CHEMICAL ANTIOZONANT

In compounding rubber, there are several things which are important in assuring maximum crack-free life. First, you must use a potent antiozonant like UOP 88 or 288. Next, consider what a vast difference in effectiveness can be realized by your *curing system*.

The right antiozonant used in correct proportion is of primary importance. Then, by using the proper accelerator, you can promote its maximum effectiveness, and thus contribute to maximum ozone protection.

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems—a vast increase in resistance to cracking. The table above the test strips shows how the *proper* accelerator aids antiozonant effectiveness.

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants in your rubber formulations is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

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UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

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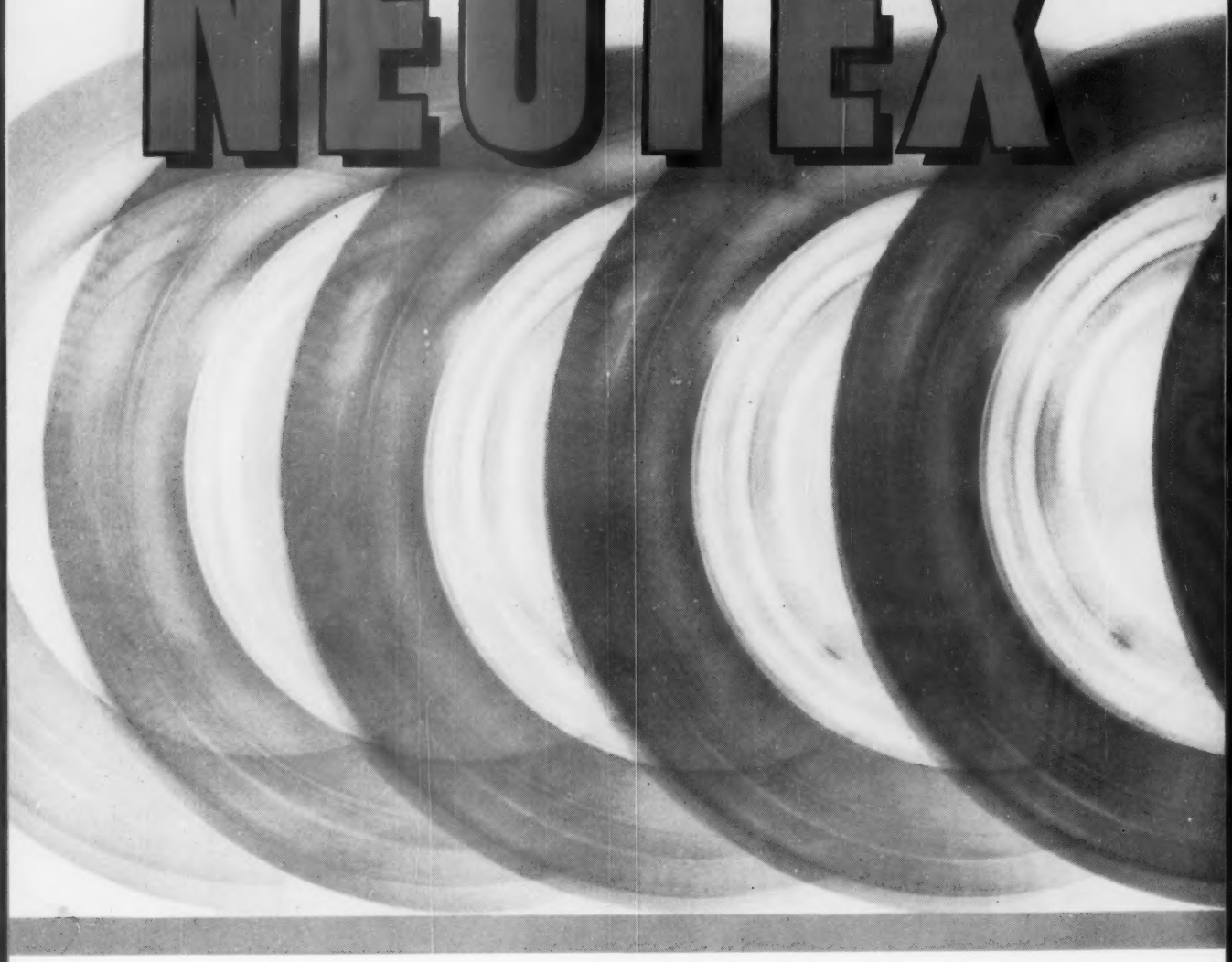

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NEOTEX 100

. . . in the HAF fineness range . . . develops! ow modulus . . . for use in carcass stocks, natural rubber treads, high grade mechanicals, etc. Now being used as a Channel replacement.

NEOTEX 130

. . . in the ISAF fineness range . . . develops low modulus, good tensiles, high elongation and lower Shore Hardness . . . for improved ride in passenger tires.

NEOTEX 150

. . . in the SAF fineness range . . . produces highest tensiles of any rubber carbon . . . gives best ride-noise-tread wear combination . . . tailor-made for the Black Rubber process.

B-1

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A-420

- HORSE HEAD A-420 is particularly suited for all types of rubber compounding, including latex. It incorporates readily, producing bright whites and clean tints.
- In whitewalls of tires, A-420 contributes free-chalking properties and dynamic flex-crack resistance.
- In rubber compounds designed for low moisture absorption, such as those for electrical applications and mechanical goods (packings), A-420 is frequently employed because of its low water-soluble-salts content.
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• **Italian Levies on Imported Tires.** We have received a letter from Dr. Ugo Supino, managing director of Assogomma (Associazione Nazionale fra le Industrie della Gomma Cavi Elettrici e Affini), Milan, Italy, offering further clarification on the subject of import duties on merchandise originating in European Common Market countries (referred to in our March, 1961 column). Dr. Supino points out that under the rules of the Rome Treaty, it was agreed that January 1, 1957 would be the starting point for reductions in the duty—each amounting to ten per cent of the original duty. The latest duty reduction went into effect January 1, 1961, with another reduction due at the end of this year. Our correspondent summarizes the tax situation as follows:

TAXATION ON TIRES IMPORTED INTO ITALY FROM E.E.C. COUNTRIES

(Per Cent of Total Value)

	1-1-57	*1-1-61*
Duty	25%	17.5%
Turnover tax	3%	3.3%
Compensatory tax	3%	5.0%
Total	31%	25.8%

Dr. Supino argues from the above figures that: (1) the original duty has been cut by 30 per cent, in accordance with the Treaty; (2) the rate of the turnover tax has, meanwhile, been increased by 0.30 Italian cents. As this increase was applied to all purchases, domestic as well as foreign (under a law enacted December 16, 1959), no discrimination was effected between Italian and foreign goods; (3) the increase in the compensatory tax from 3 to 5 per cent—agreed on in August, 1960, in order to narrow the gap between the actual taxation borne by the domestic producers and the foreign ones—is far from having absorbed the decrease in the duty (2 per cent, against 7.5 per cent).

We are pleased that Dr. Supino has taken the time to set the matter in proper perspective.

• **Reclaimed Rubber.** The need for reclaimed rubber is increasing rapidly, in proportion to the increasing number of rubber products. One of the American firms helping to create rubber reclaiming industries abroad (U. S. Rubber Reclaiming) has already licensed three foreign firms to use its patented process, and it expects to increase its licensing program in the next few years.

The most recent firm to conclude a licensing agreement for the company's Reclaimator process is Gamid Rubber of Israel. The plant, which will have a capacity of 7,000 pounds of reclaimed rubber a day when finished next year, will supply three major and several smaller manufacturers in Israel's growing rubber industry. The initial investment for the reclaiming installation plus auxiliary machines amounted to $300,000.

• **Furniture Fair—Cologne, 1962.** Reflecting the ever-increasing importance of rubber products for the furniture industry, quite a number of rubber concerns were represented at the last International Furniture Fair in 1960. A total of 894 exhibitors covered over 22 acres of display space; 291 foreign firms from 18 countries showed their products to 65,000 qualified trade visitors from 51 different nations. The next International Furniture Fair in Cologne will take place from January 31 to February 4, 1962. All leading European and foreign manufacturers of furniture will be represented.

• **Inhibition of Natural Rubber Hardening.** This is the theme of a feature article in our French contemporary, *Revue Generale du Caoutchouc*. The writer offers new confirmation of the assumption that aldehyde groups are integrated in the polyisoprene chain when the latex flows out of the tree. Such groups are considered to be chiefly responsible for the formation of gel in dry rubber during storage. After describing a simple method for estimating the number of such groups per molecule of rubber, the author outlines the results of a study of the relationship between the content of aldehyde groups and the hardening of clonal rubbers during accelerated storage tests.

• **English Have Trouble With Exports.** The chairman of the Chartered Bank, London, devoted quite some time to the lagging efforts of British manufacturers and exporters in his last report at the general meeting of the shareholders. After pointing to the rapidly increasing possibilities for foreign trade in various parts of the world, he emphasized that the British Government, like that of the United States and many highly industrialized countries, is now launching an export drive. We find, however, that the growing awareness in England of the necessity to export is not, so far, being translated into efforts to find new markets. It is a common complaint of officials and businessmen in a number of Eastern countries that the United Kingdom shows little interest in her markets—an attitude, they point out,

which is in marked contrast to the attitude of the Germans, the Japanese and others. There is undoubtedly some truth in what is said, for it often seems that either our usual exporters already have enough buyers for their products, and cannot devote the time to smaller and less well-known markets, or there is an instinctive feeling that too much risk is involved. Sometimes there is risk, but usually, with competitive prices and a willing buyer, means can be found to arrange shipments on a satisfactory basis. Through its advice on these matters, and its knowledge of markets gained from 190 branches in 26 countries, it is felt that the Chartered Bank group should be able to aid materially the efforts of our exporters.

• **Buna-Huels Production Program.** At a recent meeting of the shareholders, management reported that sales of the company's products have increased, due to the improved quality of the various rubbers. At the present time, the company manufactures seven standard and eight special types of cold rubber, three latex, and two carbon-black rubber types. A special department for the production of a carbon black-cold rubber mixture has started operating: customers like the product, because they are able to buy a rubber material which contains the required amount of carbon black for manufacturing tires and other products. Furthermore, the annoying and unpleasant process of dry-mixing is not required any more.

A further step towards greater efficiency is the newly-adopted process of shipping in large quantities. Instead of continuing to ship paper bags containing approximately 70 pounds, 1800 pounds of rubber will be put on a single pallette. This, of course, makes it much easier and quicker to unload the merchandise in the rubber manufacturing plants, because the pallettes can be transported by means of fork-lift trucks.

Domestic sales in 1960 increased quite a bit, but exports suffered, due to the revaluation of the German mark and the increased efficiency of existing factories and new synthetic rubber plants in Western Europe, which constitute severe competition for some of the Buna products.

• **Record Sales at German Dunlop.** The Deutsche Dunlop-Gummi Compagnie AG, Hanau, which belongs to the International Dunlop group, established a sales record last year. Due to the increased production of automobiles in Germany, the company benefited from the increasing demand for tires. At the present time, the company is busy developing a new construction for an automobile tire. Sales of replacement truck tires slowed down last year, particularly because of the increasing use of recapped tires, but also because of the growing imports of larger tires originating in other member states of the European Common Market. However, the shareholders can be satisfied, because a dividend of 16 per cent will be paid.

• **Shoe On Other Foot.** Many American industries certainly are justified in protesting against the ever increasing imports which, in many instances, infringe heavily upon their share of the domestic market. But trade is, unfortunately, a two-way street, and it is for this reason that we illustrate the reaction of the German Agricultural and Farmers Association, which is vigorously and emphatically protesting the increased imports of American frozen poultry. The German Government has recently removed all restrictions for the imports of American frozen poultry, in order to assist in improving its balance of payments. Naturally, imports of American frozen poultry have almost doubled and reached a monthly volume of more than 3,500 tons. Consequently, the prices for poultry in Germany have been lowered quite frequently; at the present time, American poultry is offered f.o.b. the port of Hamburg, excluding duty and other charges, at approximately 29c a pound.

The German farmers and poultry raisers are unable to compete with these very low American prices because of the high cost of feed in Germany. Feed prices in Germany have been artificially pegged at a high level in order not to destroy the price structure for other grain products. The Association of German Farmers has requested the authorities to impose a certain tax upon American frozen poultry in order to equalize its prices with the prevailing level of domestic products.

Naturally, the importers have also protested vigorously. They point out that heretofore the Germans have consumed only about four pounds of poultry a year, whereas now, based upon the lower American quotation, consumption has jumped to more than ten pounds a year.

• **Dutch Tire Production to be Increased.** The factories of the Netherlands-American Motor Tire Co., operated jointly by the Dutch Vredeisten Co. and the B. F. Goodrich Co., have a capacity of 3,500 tires a day, compared with 1,800 units in 1956. Management contemplates improving the research and development department and increasing the capacity of the factory in order to satisfy the requirements of the European Common Market. The Vredeisten Company, which operates four factories in The Netherlands, is the largest producer of rubber items in the Benelux countries which consist of Belgium, Holland, and Luxembourg.

• **Rubber Production in Poland.** According to an official report of the Polish Government, the following quantities of rubber and tires were produced in Poland in 1959: synthetic rubber—5,000 tons; polystyrene—1,760 tons; 1,062,600 automobile tires; and 315,600 motorcycle tires.

• **Rubber Production in Hungary.** In 1959, the Hungarian rubber industry produced 82,079 automobile tires, 231,086 truck tires, 1,624 tons of conveyor bands, and 191 tons of rubber belting.

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TYPICAL INSPECTION DATA

Total Solids, wt %	55
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pH	5.0
Viscosity, cps	560
Mechanical Stability	Excellent
Freeze-Thaw Stability	Excellent
Chemical Stability	Excellent

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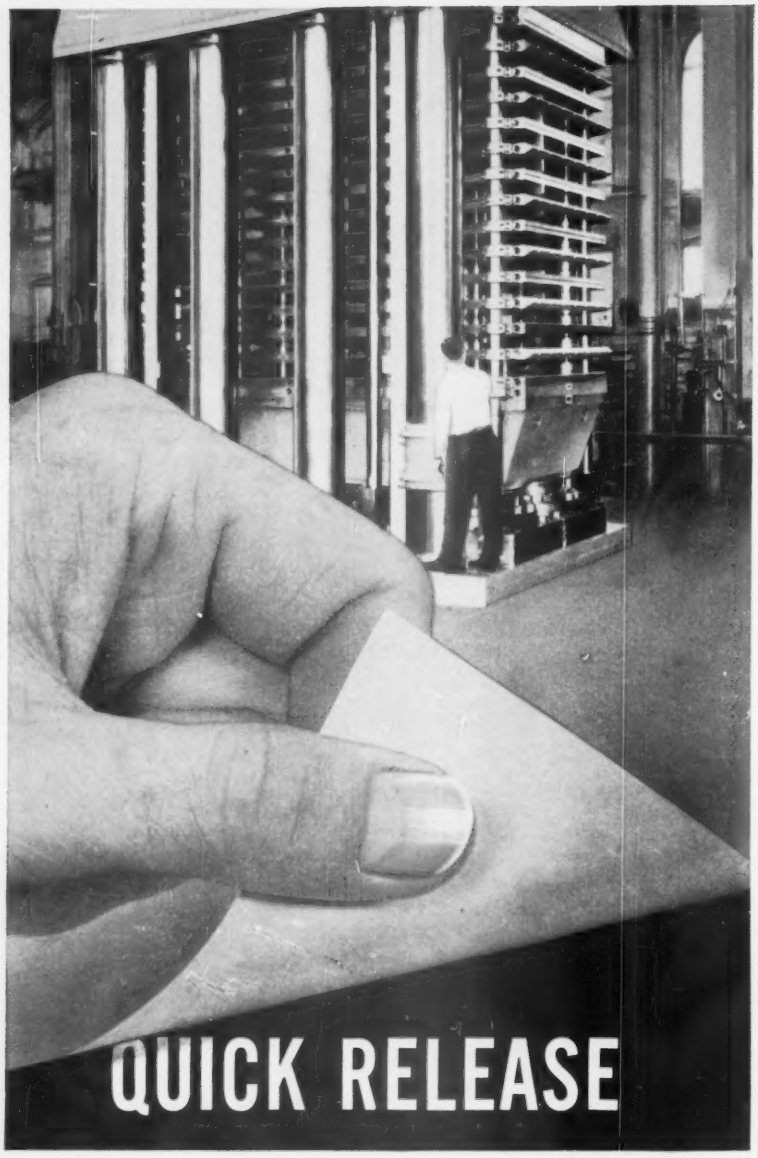

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News in Brief

► Reeves Brothers, Inc., New York, N. Y., has licensed Sunbury Textile Mills Inc., Sunbury, Penna., and American Laminators, Inc., Brooklyn, N. Y., to carry out Reeves' patented heat laminating process, and to use the trademark "Curonized" when the lamination has been made with Curon polyurethane foam.

► Hypalon Report Nos. 2, 3, and 4 are available from the Elastomer Chemicals Department of DuPont. The reports are entitled: "Practical Hypalon 40 Compounds for Molded Goods and Extrusions," "Colors for Hypalon," and "Vulcanization of Hypalon 40," respectively.

► Pliovic M-70X, a new vinyl plastic resin, has been developed by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, as a modifying material for plastisol molding and coating compounds.

► Claremont Pigment Dispersion Corp., Roslyn Heights, L. I., N. Y., has released Technical Bulletin 225 describing the performance properties and applications of its Quikmil calibrated color concentrates in the Q series.

► Pages on Philprene 1006, 1502, 1601, 1605, 1606, 1609, and 1706 have been issued by the Phillips Chemical Co., Akron, Ohio, for inclusion in its new brochure on Philprene Polymers.

► "Organic Peroxides as Catalysts" is the subject of a brochure available from the Chemical Department, McKesson & Robbins, Inc., New York, N. Y.

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has issued Technical Data Bulletin No. 141 on Ameripol 4664, and TDB No. 142 on Ameripol 4758.

► Hercules Powder Co. has put a 60 million pound per year polyolefin unit on stream at Lake Charles, La., and is constructing a second unit with a like capacity.

► Harwick Standard Chemical Co., of Illinois, has moved its Chicago office to 5717 N. Elston Ave., Chicago 46, Ill. The new telephone number is Spring 5-4434.

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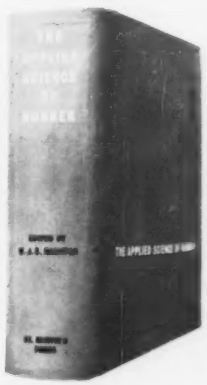

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Overseas

India—A synthetic rubber plant with a capacity of 20,000 tons per year, and a carbon black plant with an annual capacity of 10,000 tons, will be constructed at Nahorkatiya, India, in the hilly northeast Lakhimpur district of Assam. The region will provide natural gas which will be used to generate electricity for the two plants and various other industrial undertakings projected within the next five years. It is estimated that the rubber plant will cost 150m. rupees, and the carbon black unit will cost 10m. rupees.

Japan—AviSun Corp., Philadelphia, Penna., and Shin Nippon Chisso Hiryo, K.K., of Tokyo, have concluded an agreement, which has been approved by the Japanese Ministry of International Trade and Industry, to manufacture and market polypropylene resin, film and fiber in Japan. A new 30 million pound-per-year polypropylene plant is slated for completion some time in 1962. This is the first such agreement in the polypropylene field for an American company outside of the United States.

Australia—North Australian Rubber Mills, Ltd., Brisbane, Australia, is seeking an arrangement with a United States firm, to include a licensing agreement for the manufacture in Australia of an American line of general rubber goods and/or plastic foams. The firm has adequate space and mill capacity for expanded production, and has a distribution branch in Sydney. An associate distribution company in Melbourne maintains branches in a number of other Australian cities.

Rhodesia—The rubber plantation at Nkata Bay in the Northern Province of Nyasaland, currently producing some 300 pounds of rubber per acre annually, will import rubber trees from West Africa to boost output of the Federation of Rhodesia and Nyasaland. The plantation, with over 75,000 trees in production, is the country's only rubber producer.

Ceylon—Discussions are being held between Ceylonese and Chinese trade officials concerning prices and quantities of next year's supply of Chinese rice to Ceylon under a barter pact. When agreement in principal on the price of rice is reached, a Chinese trade team will be sent to Colombo to hold talks on the amount and price of the rubber which Ceylon will exchange for the rice.

Israel—Alliance Rubber & Tire Co., Hadera, Israel, and American Latex Products Corp., a subsidiary of Dayco Corp., are planning to construct a plastics plant in Caesaria, Israel.

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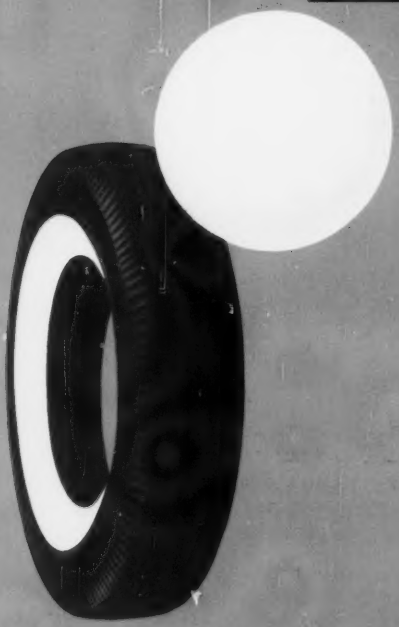

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- Prices of natural, synthetic and reclaimed rubber
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Issued monthly, the RUBBER STATISTICAL BULLETIN is published by the Secretariat of the International Rubber Study Group in London, England. This group is the international organization established to collect statistical and other general information on rubber. Regular statistics are furnished by the numerous governments cooperating in the program, with the result that the figures published are the nearest approach to world-wide official figures.

Each issue of the BULLETIN is replete with up-to-the-minute data on the production, consumption, exports, imports and stocks of rubber. Some 60 separate tables are used to enable the subscriber to locate specific statistical information on practically any phase of the rubber market. Constant revisions are made in the tables and the tabular data to provide more detailed information. A quick ten-year picture is given in almost every instance.

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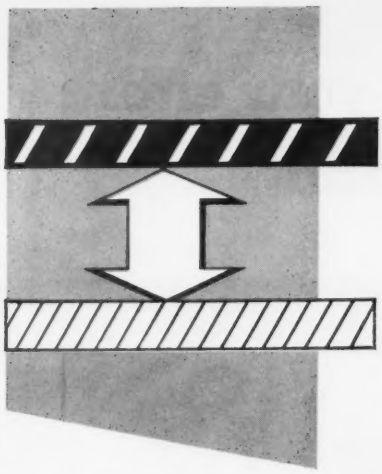

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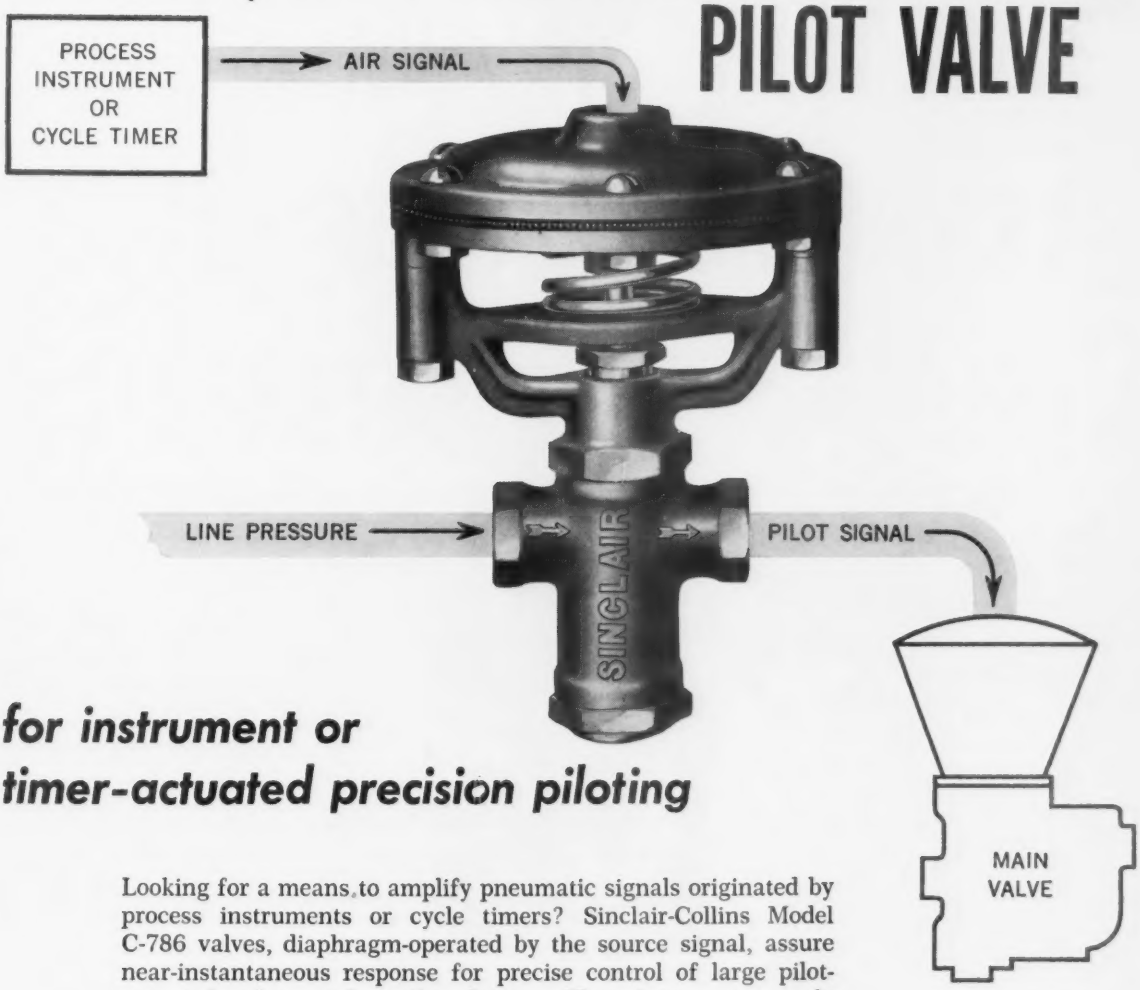

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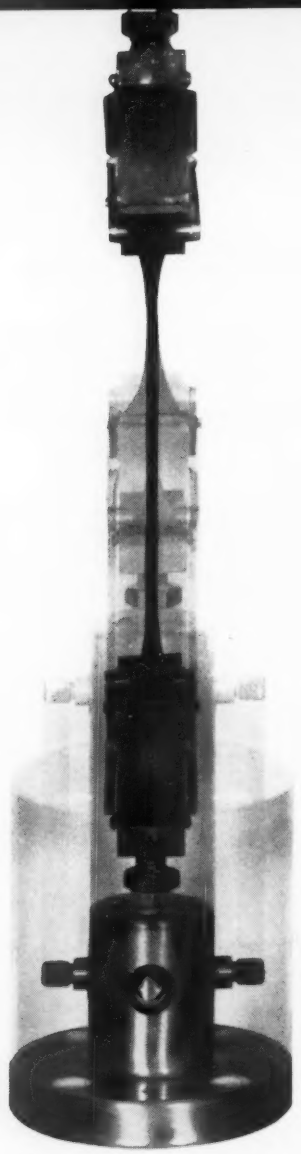

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150	"	for styrene rubber, nonblack
259	"	for nitrile rubber, black
97	"	for nitrile rubber, nonblack
254	"	for neoprene, black
116	"	for neoprene, nonblack
101	"	for butyl, black
57	"	for butyl, nonblack
50	"	for polysulfide, black and nonblack
36	"	for reclaim (all black compounds)
45	"	for Hypalon, black and nonblack
86	"	for silicone rubber, black and nonblack
92	"	for vinyls (all nonblack compounds)
100	"	for miscellaneous other rubbers, black and nonblack
156	"	for blends of general purpose rubbers (natural, styrene, butyl, reclaim), black
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2365	compounds	Total

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Tear strength is high

Ratio of natural rubber to SBR	Tear Strength — 125 Part Loading		Tear Strength — 150 Part Loading	
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0-100	200 pit	175 pit	220 pit	200 pit

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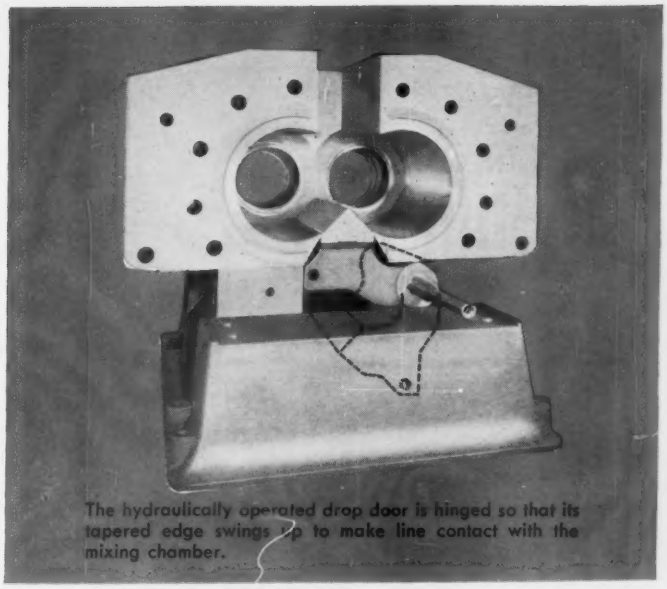

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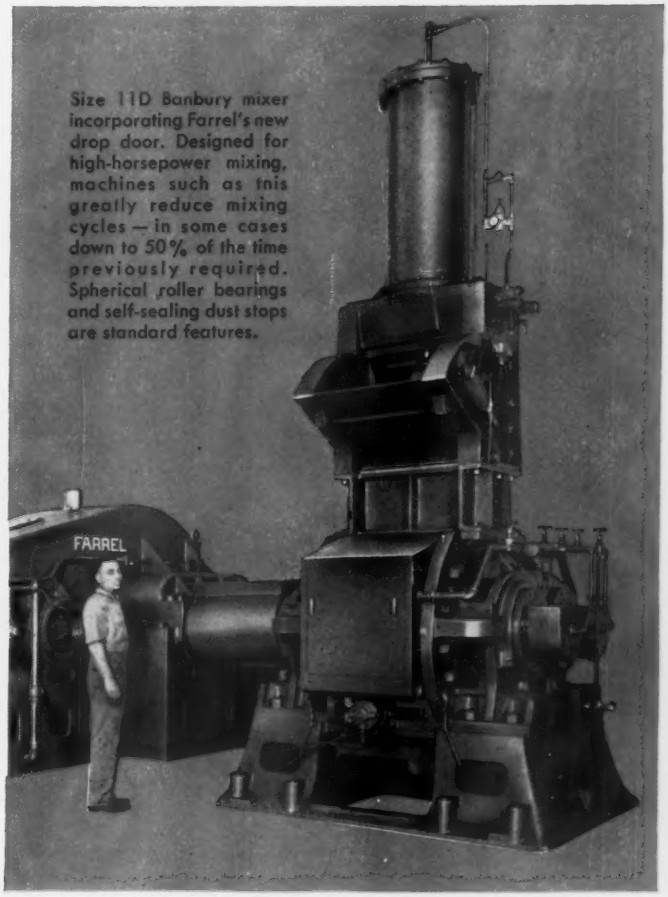

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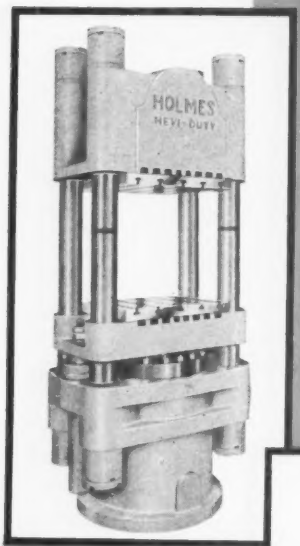

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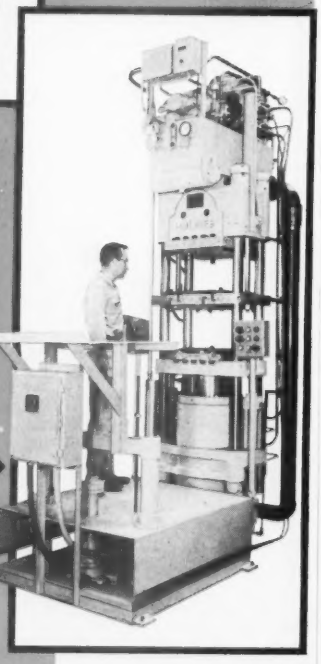

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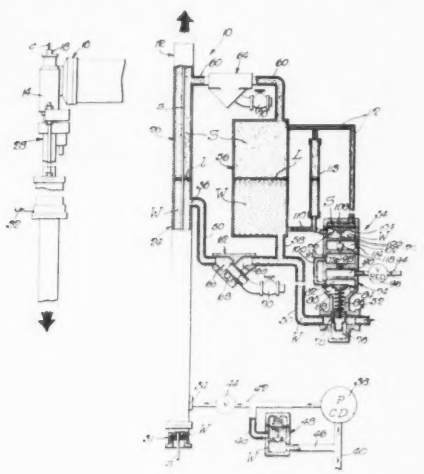
PATENT REVIEW

by Melvin Nord

Continuous Conduit-Type Vulcanizing Apparatus

U. S. Patent 2,952,870, issued September 20, 1960, to Edward M. Mark, and assigned to Standard Machinery Division of Franklin Research Corp., describes apparatus for vulcanizing an extruded rubber jacket on a continuous core while in motion.

It is the primary aim and object of the invention to provide vulcanizing apparatus of the continuous conduit type which not only lacks a seal between the steam and water, but also has a control over the water flow through the cooling leg of the conduit. This control is so accurate, and the volume of water in it at any instant varies so little from a preset volume, that the inevitable surges of the meeting level of the steam and water, as caused by variations in the rate of steam condensation and other unavoidable factors, are suppressed sufficiently to be to all practical intents and purposes, nonexistent. The result is that a product processed in the apparatus is vulcanized fully and most uniformly without requiring either supervision or correction, at any time, of the water-flow control performance during an operating run of the apparatus, regardless of duration.



The figure shows such an apparatus. The vulcanizing conduit (12) is connected at its top with the head (14) of an extruder (16). The stock (s) to be vulcanized is, in the present example, a rubber-coated core of conductive wire or cable. The continuous core (c) is passed into the inlet end (18) of the extruder head (14), which carries near its outlet end (20) an extrusion die,

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PATENT REVIEW

through which the core passes while receiving an extruded coating of insulation material—customarily, uncured natural or synthetic rubber. This extruded coating is vulcanized during the passage of the stock (s) through the conduit (12) from the top to the bottom. The vulcanized stock, after its passage from the conduit (12) is passed over a power-driven capstan and then wound on reels.

For the vulcanization of the extruded coating on the stock (s), the conduit (12) receives steam under pressure. Cooling water is also circulated through a lower length of the conduit (12), for the purpose of causing condensation of entrapped steam within the coating before the stock (s) emerges into atmospheric pressure at the bottom end of the conduit (12). To this end, the conduit (12) provides a water leg (24) and a steam leg (26) above it, with the meeting level of the steam and water held constant at the junction of these legs.

Oil-Carbon Black Synthetic Rubber Masterbatches

U. S. Patents 2,955,096 and 2,955,097, issued October 4, 1960, to Woodrow W. White, and assigned to the U. S. Rubber Co., disclose methods of preparing oil-carbon black synthetic rubber masterbatches.

In the former patent, the oil and carbon black are intimately mixed in the absence of water, and then dispersed in water with an anionic dispersing agent to form an anionic dispersion of oil-coated carbon black particles. This dispersion is then mixed with an anionic butadiene polymer synthetic rubber latex, and this is followed by co-coagulation.

Elastic Polyurethane Composition

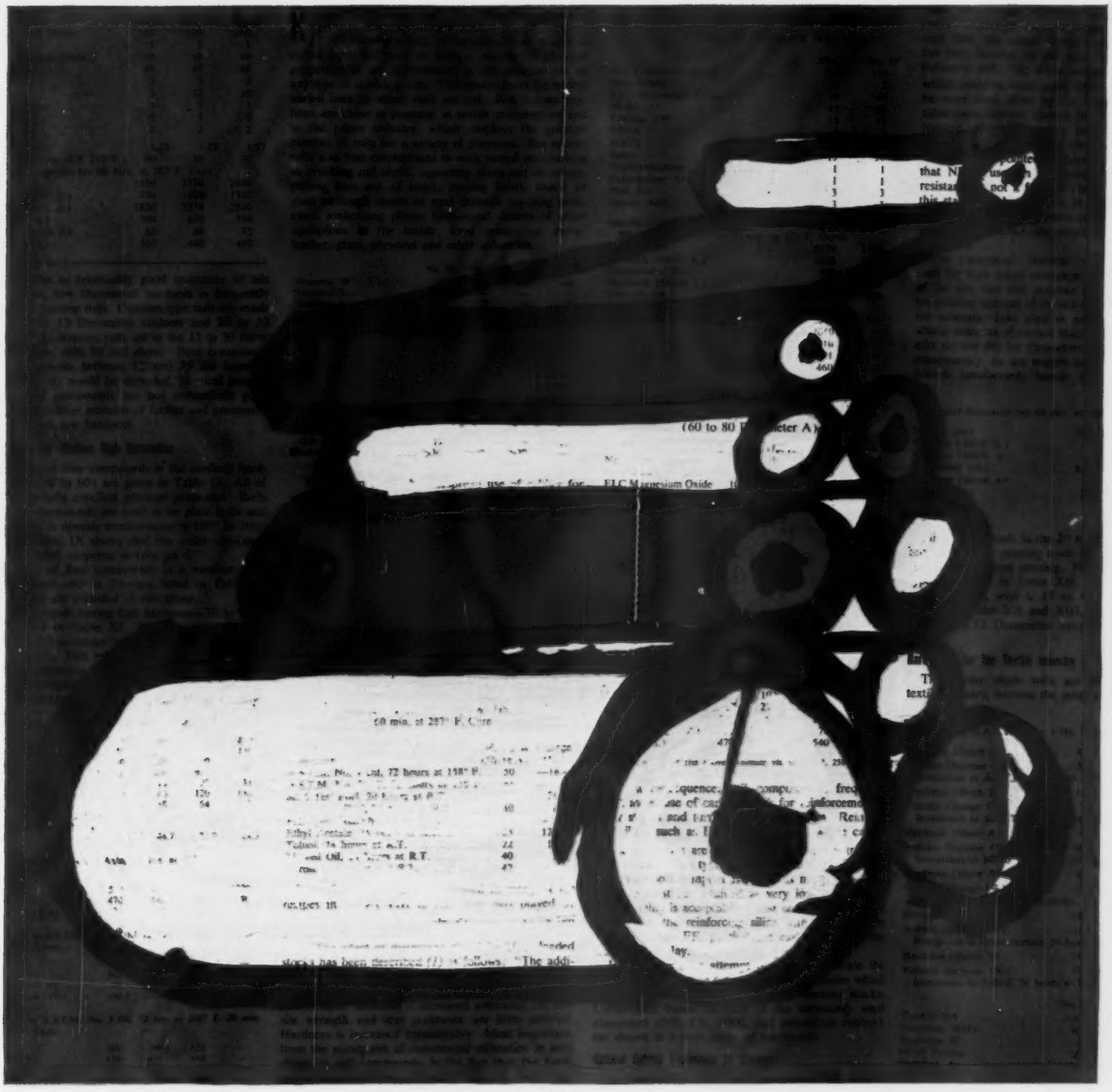
U. S. Patent 2,951,053, issued August 30, 1960, to Franz G. Reuter and Jurgen Ulderup, assigned to the Mobay Chemical Co., describes an elastic polyurethane composition.

The composition contains up to 5 per cent of molybdenum disulfide, diselenide, or ditelluride, or tungsten or titanium sulfide. It also contains up to 5 per cent of a silicone oil or of petroleum lubricating oil, kerosene, or wax.

Production of Chloroprene

U. S. Patent 2,948,761, issued August 9, 1960, to the Distillers Co. Ltd., describes a process for the production of chloroprene.

The process consists of heating 3:4-dichlorbutene-1 with an aqueous solution of an alkali in the presence of a substance furnishing thiocyanate ions, *i.e.* an alkali metal or alkaline earth metal thiocyanate.



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PATENT REVIEW

Textile Element Treatments

U. S. Patents 2,955,344 and 2,955,345, issued October 11, 1960, to Irven B. Prettyman and to Donald E. Howe, respectively, and assigned to the Firestone Tire & Rubber Co., describe methods of treating textile elements.

In the former patent, a previously dipped and dried continuous textile element, consisting of polycaprolactam, is heated to 320°-400°F., while stretching it not over 21 per cent of its original length. The element is then maintained at 380° to 400°F. while relaxing it partially.

In the latter patent, a continuous nylon element is heated to 350° to 400°F. and stretched 4 to 16 per cent of its original length. It is then partially relaxed at a lower temperature to reduce the shrinkage and growth characteristics of the element.

Fungus-Resistant Elastomer

U. S. Patent 2,951,850, issued September 6, 1960, to Benjamin D. Halpern and Wolf Karo, assigned to the Borden Co., discloses the composition of a fungus-resistant elastomer.

The elastomer is a copolymer of 75 to 98 parts by weight of the trifluoroethyl ester of acrylic acid, and 2 to 25 parts by weight of N-1,1-dihydroheptafluorobutyl acrylamide.

Other Patents of Interest

Subject	Assignee	Patent No.	Date
Extruder with jointed feed screw	National Rubber Machinery Co.	2,946,089	7/26/60
Feeding mechanism for extruders	U. S. Rubber Co.	2,947,030	8/ 2/60
Machine for assembling resilient bushings of the rubber insert type	General Tire & Rubber Co.	2,947,070	8/ 2/60
Epoxide cure of rubbery copolymer containing a reactive carboxyl group	Firestone Tire & Rubber Co.	2,947,338	8/ 2/60
Tire construction	B. F. Goodrich Co.	2,947,339	8/ 2/60
Tubeless tire and chafer	Firestone Tire & Rubber Co.	2,947,340-3	8/ 2/60
Non-blooming, non-staining rubber antioxidants	Firestone Tire & Rubber Co.	2,947,724	8/ 2/60

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.

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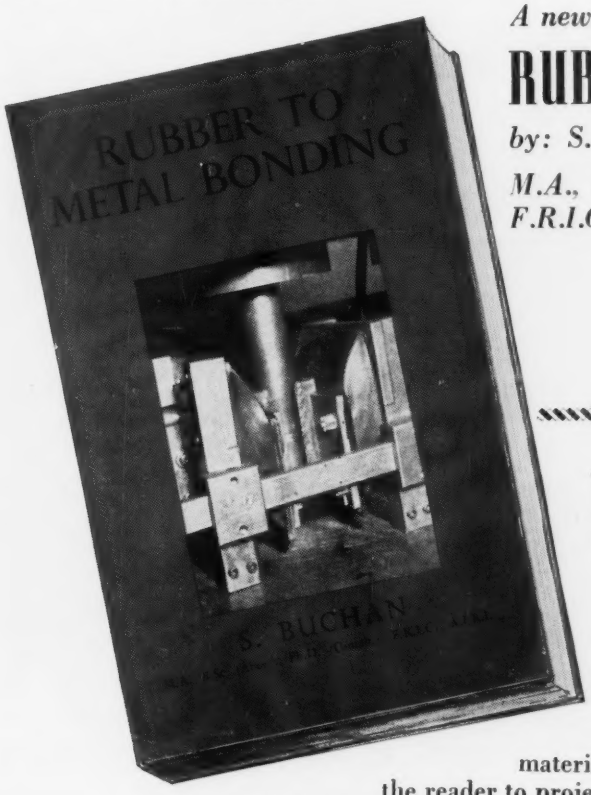

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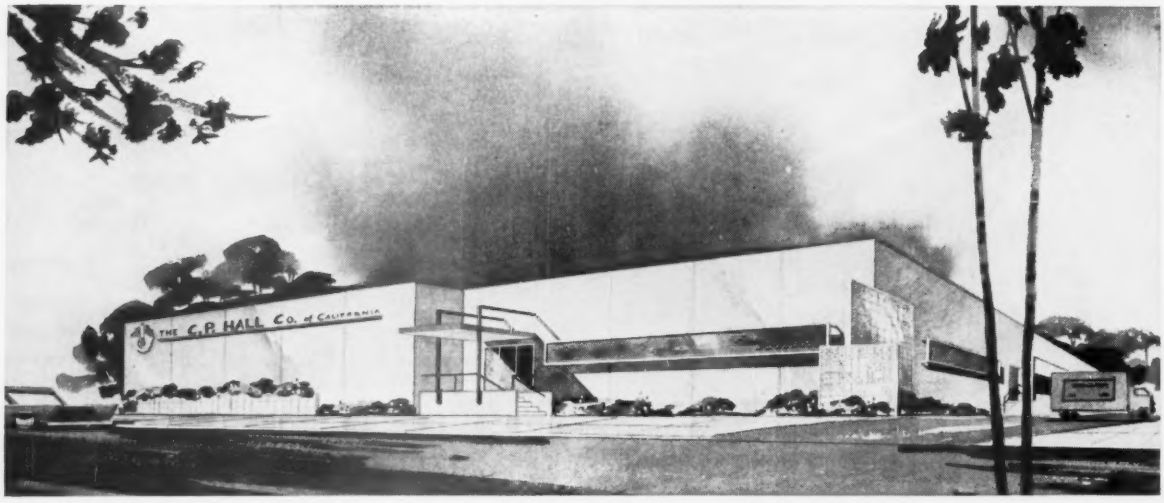

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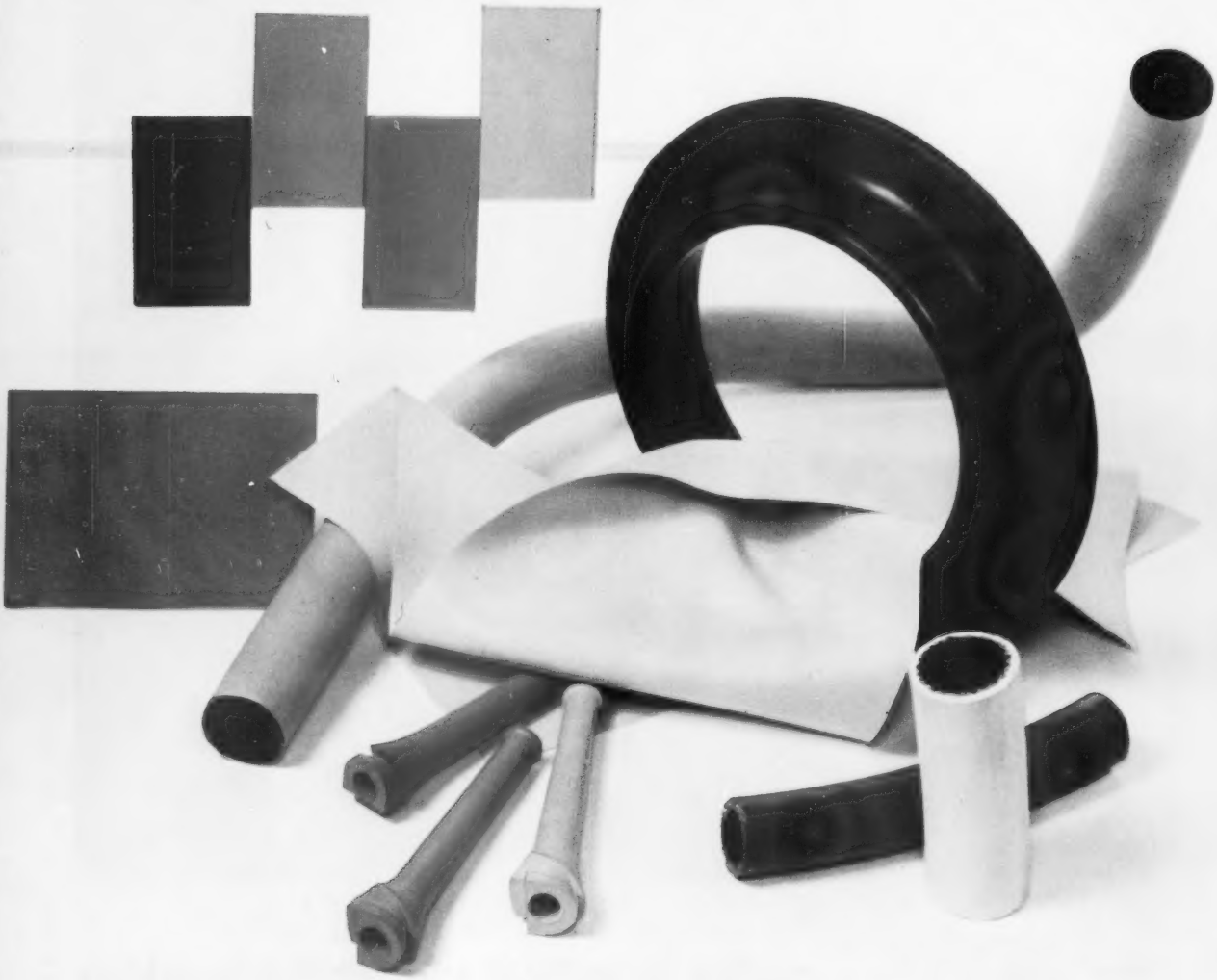

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Ultrafine TALC/SAF BLACK Mixtures in SBR-1500

By R. S. LAMAR, M. F. WARNER, and H. T. MULRYAN
Sierra Talc Co., South Pasadena, Calif.

THE use of talc as a filler in solid rubber products is not new. Until recently, rubber chemists have regarded talc as only a filler which provides little or no reinforcement, *(1, 2)*. Basic studies concerning the nature of talc surfaces showed that highly platy talcs are strongly hydrophobic or organophilic at the planar crystal surfaces. Newly developed ultrafine grinding techniques greatly increase the extent of this organophilic surface *(3)* and such products are effective rubber reinforcing agents, being comparable to fine particle carbon blacks in this respect *(4)*.

More recently discovered are the apparent synergistic effects of mixtures of ultrafine talc and furnace blacks, particularly SAF black, in SBR-1500 *(5)*. The substitution of varying amounts of an ultrafine talc for SAF black by volume, improves:

(1) Physical properties
  (a) Tensile strength—increases from 4400 to as high as 4600 lbs./sq. in.
  (b) Ultimate elongation — increases from 700 per cent to as high as 850 per cent.
  (c) 300 per cent modulus—declines from 1050 to as low as 450.
(2) Processing
  (a) Mooney viscosity—reduced.
  (b) Heat build-up—reduced.
  (c) Nerve—reduced.
  (d) Extrusions—smoother.

Abstract

► A platy talc product of unique chemical purity, ultrafine particle size and high surface area is a highly effective rubber reinforcing pigment. Combined with SAF black this material greatly improves processability by reducing nerve, Mooney viscosity and heat build-up. SBR-1500 vulcanizates containing a mixture of this ultrafine talc and SAF black show higher tensile strength and greater ultimate elongation than do those with equal volume loadings of either pigment alone.

This paper was presented at the Fall Meeting of the Division of Rubber Chemistry, American Chemical Society, New York, N. Y., September 16, 1960.

Compounds

This discussion covers three distinct series of ultrafine talc/SAF black mixtures using SBR-1500 polymer. Tables I and II show the compounds used for two of these series in which an all-black masterbatch has been blended in various ratios with an all-talc reinforced compound. In Table I the all-talc reinforced compound contains 75 phr ultrafine talc, the level which provides the highest tensile strength and ultimate elongation *(6)*. In this series the amount of light process oil decreases as the amount of ultrafine talc increases. Previous studies showed that at

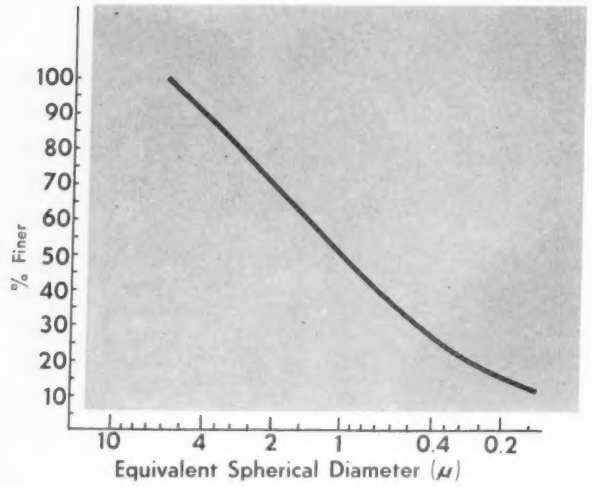

FIG. 1—Particle size distribution of ultrafine talc (Mistron Vapor).

75 parts talc and below, additions of process oil reduce the physical properties of ultrafine talc reinforced SBR. However, at higher loadings (100 to 200 phr ultrafine talc), additions of small amounts of process oil are beneficial *(7)*.

In Table II the all-talc reinforced compound is at a loading of 61.2 phr, the same volume loading as the all-SAF black extreme. The total amount of light process oil remains constant in these compounds.

In Tables I and II the amounts of sulfur and Altax vary as the black/talc ratio changes. In all cases, the presence of a polyethylene glycol is essential to the development of the best reinforcing effects of the ultrafine talc. Previous publications indicate the reasons for these compounding adjustments *(8)*.

Raw Materials

Ultrafine Talc—Mistron Vapor (Sierra Talc Co., South Pasadena, Calif.) shows these properties:

Chemical composition—essentially pure hydrous magnesium silicate.
Specific gravity—2.75.
Particle shape—platy, micaceous.
Particle size:
(a) Surface area—20 m^2/g by BET-N_2 adsorption.
(b) Surface mean diameter—0.5 microns by gas permeability.
(c) Particle size distribution—see Figure 1.
Color—white.

SAF/SBR-1500 Masterbatches — Baytown B-169 (United Carbon Co., Houston, Texas); Philprene 6604 (Phillips Chemical Co., Borger, Texas). Both masterbatches consist of 100 parts 1500 type polymer, 40 parts SAF black and 5.0 parts light process oil.

SBR polymer—S-1500 (Shell Chemical Co., Torrance, Calif.).

Polyethylene glycol—Triethylene Glycol and Polyglycol E-300 (Dow Chemical Co., Midland, Mich.).

Light Process Oil—Bearflex LPO (Golden Bear Oil Co., Oildale, Calif.).

Benzothiazyl disulfide—Altax (R. T. Vanderbilt Co., Inc., New York, N. Y.).

Sulfur—Tube Brand, conditioned sulfur (Stauffer Chemical Co., Los Angeles, Calif.).

Zinc oxide—Pasco (lead-free, French process) (Pacific Smelting Co., Torrance, Calif.).

Stearic acid (Vopcolene Division, Emery Industries, Inc., Los Angeles, Calif.

Antioxidant—Aminox (Naugatuck Chemical, Naugatuck, Conn.).

Compounds were prepared on a 4 by 8-inch Thropp laboratory mill with cold water circulating through the mill rolls. Sample slabs were cured for six different times, both below and above the optimum cure time as judged by tensile strength.

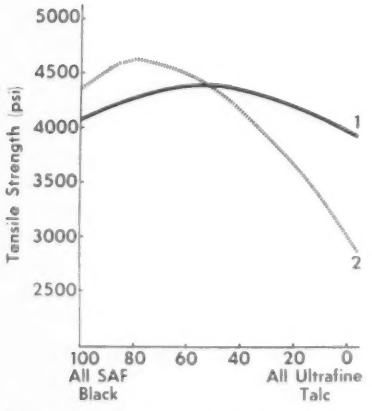

FIG. 2—Increased talc percentage gives increases in tensile strength.

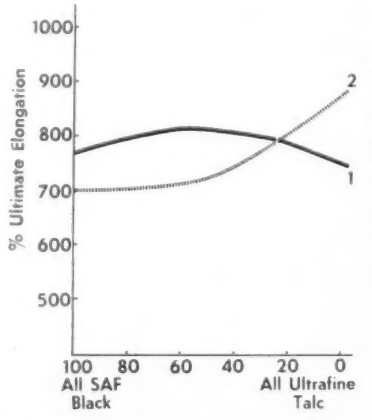

FIG. 3—Substitution of some talc for SAF black also increases elongation.

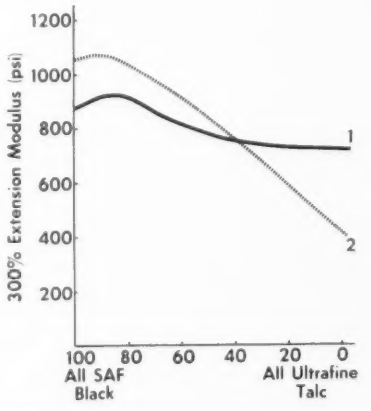

FIG. 4—Modulus values increase, then drop as talc exceeds 20 per cent.

Testing

An Instron tester, operated at a jaw separation rate of 20 inches/minute, measured tensile strength, elongation, tear strength and moduli according to ASTM procedures. Mooney viscosity, scorch and cure rate, and Shore A hardness were established by ASTM methods on the appropriate instruments.

Figures 2 through 13 show the test results, some of which are most unusual and merit special comment. Replacement of a portion of the SAF black with ultrafine talc results in marked increases in tensile strength and elongation (Figures 2 and 3). Modulus values increase slightly then drop as this replacement exceeds 20 per cent of the SAF (Figure 4).

In Series 1, Shore hardness shows a steady increase as SAF black is replaced with ultrafine talc. In Series 2, where the total volume loading of black and talc remains constant, hardness reaches a maximum at a 60/40 ratio of the two pigments (Figure 5). Tear resistance declines in both series as talc content increases (Figure 6).

Permanent set in tension increases as talc content increases (Figure 7). Compression set does not follow set in tension and is greatly reduced in Series 2 by blending ultrafine talc and SAF black (Figure 8). Bashore rebound reaches a maximum in both series with a blend of the two pigments (Figure 9). Specific gravity of the vulcanizates increases as ultrafine talc (Sp.G., 2.75) is substituted for SAF black (Sp.G., 1.80) (Figure 10).

Mooney viscosity drops from 63 for the all-black compound in Series 2, to 30 for the ultrafine talc reinforced compound (Figure 11). Mooney scorch and cure rate are both shortened as ultrafine talc is used to replace SAF black (Figures 12 and 13). The use of a polyethylene glycol of 6000 molecular weight increases both scorch time and cure rate. Delayed action accelerators accomplish the same purpose.

In a third series *(9)*, ultrafine talc was added to the black compound of Series 1. In this manner the total pigment loading increased in 10 phr steps to 90 phr. Tensile strength rose from 4100 to 4300 by the addition of 10 phr talc. At 30 phr talc, in addition to the 40 phr SAF black in the masterbatch, the tensile strength returned to 4100 lbs./sq. in.—the same as the all-black masterbatch. In this series, modulus, hardness and tear resistance increased as the total pigment load was raised with increasing amounts of talc. Contrary to what might be expected, Mooney viscosity fell from 57 at 40 phr SAF to 54 at 40 phr SAF plus 35 phr talc. Beyond this loading, it began increasing. Equally important, the highly nervy character of the all-black masterbatch was markedly reduced at 10 phr talc and completely corrected by the addition of 30 phr.

TABLE I—75 PHR TALC-REINFORCED COMPOUND IN SIX MIXTURES WITH SBR-1500 MASTERBATCH

Ratio, SAF/Talc	Parts by Weight 100/0	80/20	60/40	40/60	20/80	0/100
Philprene 6604	145.0	116.0	87.0	58.0	29.0	—
Zinc oxide	5.0	5.0	5.0	5.0	5.0	5.0
Stearic acid	2.0	1.8	1.6	1.4	1.2	1.0
Sulfur	1.75	2.0	2.25	2.50	2.75	3.0
Altax	1.50	1.30	1.10	0.90	0.70	0.50
SBR-1500	—	20.0	40.0	60.0	80.0	100.0
Mistron vapor	—	15.0	30.0	45.0	60.0	75.0
Triethylene glycol	—	0.7	1.4	2.1	2.8	3.5
Aminox	1.0	1.0	1.0	1.0	1.0	1.0

TABLE II—61.2 PHR TALC-REINFORCED COMPOUND IN SIX MIXTURES WITH SBR-1500 MASTERBATCH

Ratio, SAF/Talc	Parts by Weight 100/0	80/20	60/40	40/60	20/80	0/100
Baytown B-169	145.0	116.0	87.0	58.0	29.0	—
Zinc oxide	5.0	5.0	5.0	5.0	5.0	5.0
Stearic acid	1.5	1.5	1.5	1.5	1.5	1.5
Sulfur	2.0	2.2	2.4	2.6	2.8	3.0
Altax	2.0	1.7	1.4	1.1	0.8	0.5
SBR-1500	—	20.0	40.0	60.0	80.0	100.0
Mistron vapor	—	12.2	24.5	36.7	48.9	61.2
Polyglycol E-300	—	0.57	1.14	1.72	2.29	2.86
Light process oil	—	1.0	2.0	3.0	4.0	5.0

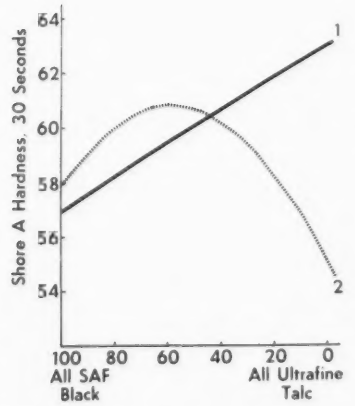

FIG. 5—Series 1 Shore hardness increases with talc; Series 2 maximum is 60/40.

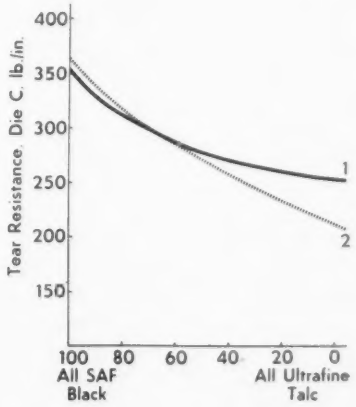

FIG. 6—Tear resistance of both Series 1 and 2 declines as talc content increases.

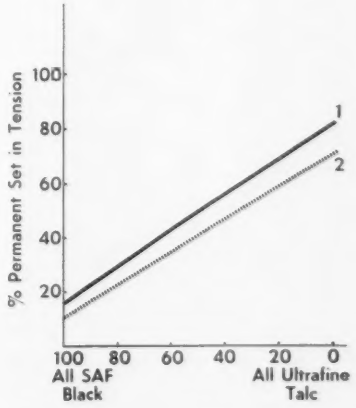

FIG. 7—Permanent set in tension increases as the per cent talc is increased.

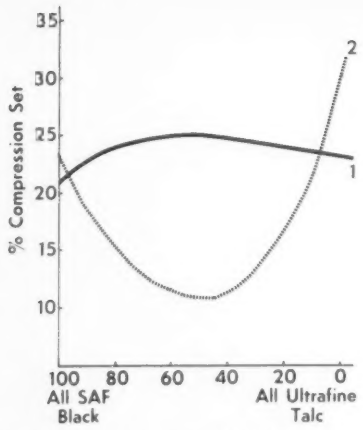

FIG. 8—Compression set (Method B, 22 hours at 70°F.) is greatly reduced in Series 2 by blending talc and SAF black.

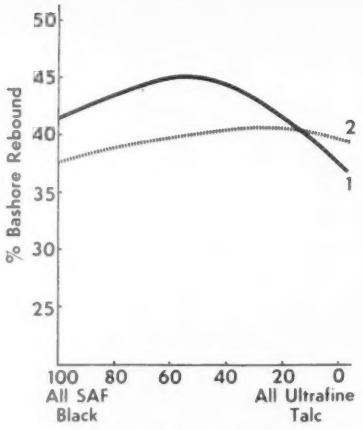

FIG. 9—Bashore rebound reaches a maximum in both Series I and II with blend of the two pigments, talc and SAF.

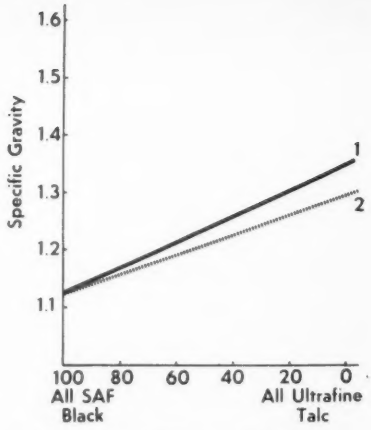

FIG. 10—Specific gravity of the vulcanizates increases with an increase in the content of talc.

Conclusions

Ultrafine talc is a valuable light colored rubber reinforcing pigment. When used alone it gives tensile strengths comparable to ISAF black and exceedingly low Mooney viscosity in SBR-1500. When combined with furnace black it provides still greater reinforcement and overcomes the processing difficulties commonly associated with these blacks. These effects are most pronounced with ultrafine talc/SAF black combinations.

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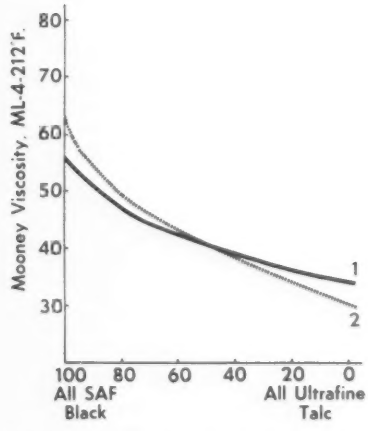

FIG. 11—Mooney viscosity drops from 63 for all-black compound to 30 for all talc.

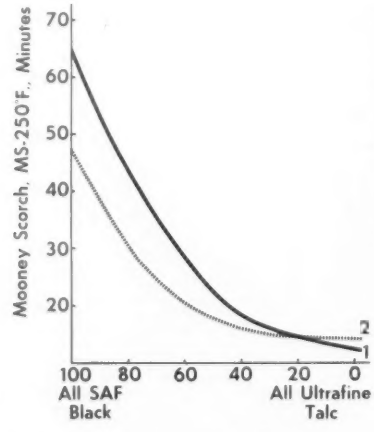

FIG. 12—Mooney scorch is shortened as talc percentage increases.

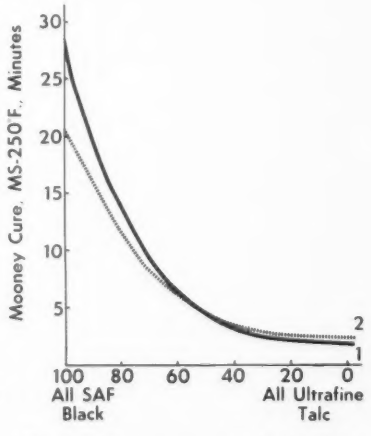

FIG. 13—Mooney cure rate is also shortened with decline in the per cent of black.

Compounding and Processing Polyisoprene Rubber

A description of its history, physical and chemical properties, and the characteristics of several of the more important end products

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DEVELOPMENTS in the field of stereoregular polymers have taken place rapidly over the past few years since Professors Ziegler and Natta announced the new catalysts which made regulated polymerization feasible. The scientific importance of this work was, of course, of the utmost significance: it marked a breakthrough of yet another previously impenetrable technical barrier. In the rubber field the use of these and other catalysts made possible the synthesis of polymers markedly similar to natural rubber and, in addition, led to the production of stereospecific polybutadiene, which exhibits interesting properties in its own right.

As would be anticipated from the close structural similarity of *cis*- 1,4 polyisoprene to Hevea, the properties and characteristics of the two materials are strikingly alike. The differences which do occur may be modified by a broadened appreciation of specific techniques for handling the synthetic material. It is the intention of this paper, therefore, to discuss not only the similarities but also to suggest approaches which have proved successful in obtaining the optimum performance of one of the polyisoprenes, Shell Isoprene Rubber, and to consider briefly its role in the overall rubber picture.

Historical Background

As important as the scientific achievement of synthesizing stereospecific rubbery polymers undeniably was, the intense interest which followed their discovery was undoubtedly heightened by developments which had occurred on the commercial side of the rubber industry. Despite the availability of other synthetic rubbers, natural rubber was still required in many important end uses, and shortages in supply appeared imminent.

Immediately after the close of World War II as natural rubber began to return to normal marketing channels, it appeared that the huge SBR capacity which had been built up might be largely redundant. In the immediate post-war years, the U.S. government found it expedient to encourage the use of SBR by American manufacturers. Soon thereafter, however, as the war-devastated economies assumed renewed vigor, the consumption of rubber grew substantially, proceeding so rapidly that by 1955-56 it was found necessary to enlarge the production capacity for SBR and other synthetics. Whereas world SBR capacity (excluding Eastern Europe) was only about 1,000,000 tons in 1955, it is now estimated at over 2,000,000 tons (including plants under construction).

The end of this substantial growth is not yet in sight. It is obvious from the per capita rubber consumption of various countries that future rubber requirements can be expected to grow at a very substantial rate as living standards improve throughout the world. SBR and other synthetics can be used in a

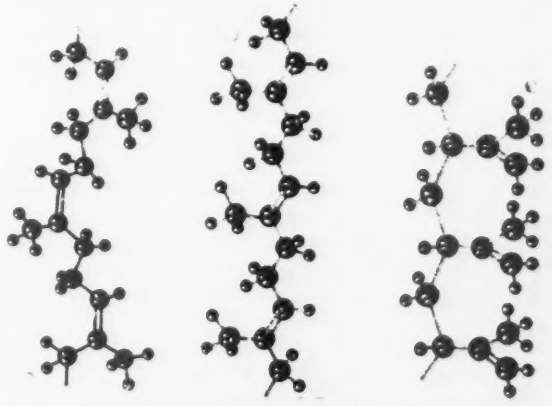

FIG. 1—Structural representations of the three principal molecular patterns of polyisoprene: cis-, trans-, and 3,4-.

Note: This paper was presented before the Second International Synthetic Rubber Symposium, London, England, October 11 to 13, 1960. It is printed here through the courtesy of *Rubber and Plastics Age* (London), sponsor of the meeting.

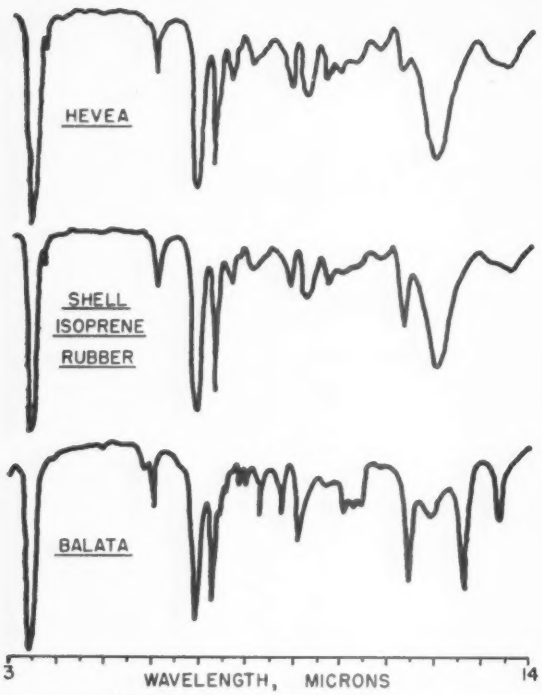

FIG. 2—Infrared spectra of polyisoprenes.

wide variety of applications to provide high quality rubber goods, and it is anticipated that the usage of these synthetics will continue to grow in many end-use applications.

An important segment of the rubber industry, however, requires substantial quantities of natural rubber because of certain applicational requirements for specific properties which were provided, up to now, only by this material. The productive capacity of natural rubber, unlike the synthetics, has been relatively static and not as immediately responsive to increased demand, because of the seven years required for newly planted acreage to mature. It is obvious that with an anticipated constantly-increasing demand and relatively static supply the dangers of an imbalance would tend to become increasingly severe.

It is also obvious from estimates of the 1965 demand picture, for instance, that although a substantial growth in the use of non-stereospecific synthetics has been projected, the requirement for Hevea is substantially larger than recent production. A portion of this potential deficit may be obtained from anticipated increased natural rubber production in certain areas, such as Malaya. But any such increase could be partially offset by decreased production in other producing areas. For these reasons the commercial availability of *cis*- 1,4 polyisoprene and other stereoregular polymers which may be used in place of Hevea is of vast significance to the rubber consumer.

Usual analytical chemical techniques have been inadequate to characterize natural rubber fully. They are likewise deficient for the purpose of making a full comparison of *cis*-polyisoprene with Hevea. Some properties are of value, however, in drawing certain comparisons of these two materials. Typical values for some of the more important properties of *cis*- 1,4 polyisoprene are shown in Table I. As with natural rubber the properties may be considered broadly in two principal categories, i.e., rubber hydrocarbon content, and non-rubber content.

Of the former, one of the important considerations is the structural composition of the polymer. The three principal molecular patterns of polyisoprene —*cis*-, *trans*-, and 3,4—are depicted in Figure 1. Perhaps the best single method of determining these structures is by means of infrared analysis, and in Figure 2, infrared scans of Shell Isoprene Rubber, Hevea and Balata are compared. It is evident that the differences between Hevea and the synthetic polymer are very small. The differences in absorption peaks between *cis*-polyisoprene and Hevea on the one hand, and the all *trans*-polyisoprene, Balata, are as would be expected, quite marked. In the analysis of these scans, refined techniques as described in detail by D. W. Fraga *(1)* are being used. These are based on extended methods of analysis of structures in natural rubber resulting in a firmer basis in determining the structural composition of synthetic elastomers.

Another important characteristic of high molecular weight polymers is intrinsic viscosity (I.V.). Shell Isoprene Rubber is produced with an I.V. of approximately 8 dl/g, which corresponds to an average molecular weight (viscosity average) Mv, of about 2,100,000. The polymer is essentially linear with practically no branching and does not contain any gel. This I.V. was selected to provide an optimum balance of physical properties. Although factory processing considerations suggest the desirability of polymerization to a lower I.V., material handling, storage, and shipping problems would be encountered which would more than offset potential process advantages. *Cis*-polyisoprene, at an I.V. of approximately 8 dl/g, requires breakdown for factory processing, but this does not present any unusual problems inasmuch as

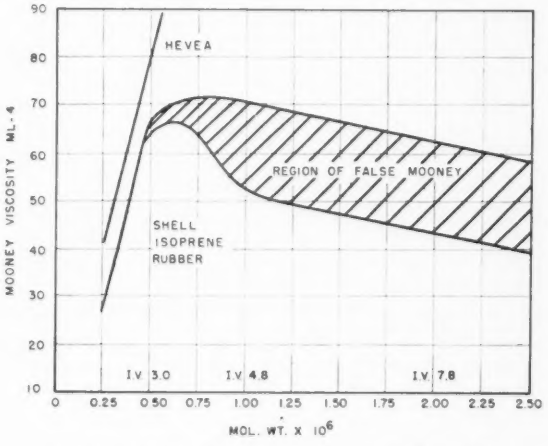

FIG. 3—Variation of bulk viscosity with molecular weight.

the polymer breaks down in a manner similar to that of natural rubber.

Polymers in the I.V. range indicated above have shown an unexpected behavior when measuring Mooney viscosity. In natural rubber it is well known that as molecular weight increases, the resulting Mooney viscosity of the polymer also increases, as shown in the dotted line of Figure 3. It was anticipated that the relationship of Mooney viscosity to molecular weight of isoprene rubber would follow the same course. It has, in fact, been found that the Mooney viscosity does not follow a straight line relationship with respect to molecular weight. Instead, as the latter exceeds approximately 600,000, the Mooney viscosity starts to fade off into the "region of false Mooneys." In these areas the subnormal Mooney viscosities are not caused by lower actual Mooney viscosity but rather are due to a cleavage of the rubber in the Mooney cavity, yielding distinct pieces of rubber, which results in a measurement of the friction between the cleavage planes, rather than a measurement of plastic flow of the polymer in shear. This behavior is similar to that of butyl rubber and of high molecular weight SBR.

As isoprene rubber is subjected to milling or mastication in the Banbury mixer, the apparent Mooney viscosity values will normally increase until a molecular weight of approximately 800,000 is reached. Further mastication will then result in the more normally anticipated reduction of Mooney viscosity.

The color and aging characteristics of the polymer are of considerable significance in various end uses. The isoprene rubber is virtually colorless because of its inherent high chemical purity and the absence of color-forming bodies. This inherent light color is protected through the manufacturing process and storage by the addition of a non-discoloring, non-staining antioxidant, and enables the ultimate consumer, by the use of additional antioxidant, to protect the light color through subsequent processing steps and use of the finished article.

The ash content of the material is quite low and consists mainly of calcium compounds with a practically complete absence of heavy metal prodegradents. This consideration obviously suggests greater inherent stability and also good electrical properties.

Compounding

The preceding discussion indicates that the isoprene rubber is markedly similar to Hevea in many of its important physical characteristics. This similarity carries over to the techniques employed in fabricating the polymer and in the properties of the product made from it. Nevertheless, some differences between *cis*-polyisoprene and natural rubber have been observed and these minor differences should be taken into account in order to obtain optimum properties from the synthetic product. Because the synthetic polymer has been available for only a relatively short time, considerable work is still under way on its processing and formulation. Thus the data accumulated

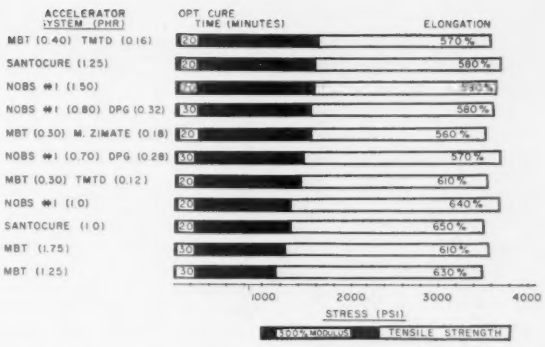

FIG. 4—Accelerator variations in isoprene rubber tread stocks.

to date should be considered as a starting point for possible modification to suit individual processing and property requirements.

In the early work with *cis*-polyisoprene, the frequent occurrence of properties divergent from those obtained with Hevea in the same formula were thought to indicate a need for formulation changes. Subsequent work has shown that differences in physical properties between the polymer and Hevea are not so much due to the need of compounding variation as to the need for proper processing. When satisfactory mixing procedures are employed, the physical properties of the synthetic and natural rubber are, normally, sufficiently similar that compounding changes are neither necessary nor desirable.

The 300 per cent tension modulus is one property of *cis*-polyisoprene that does show some deviation from natural. When evaluated in stocks of similar composition, the 300 per cent modulus of the synthetic rubber vulcanizate is generally several hundred pounds below that of the comparable Hevea vulcanizate. In those applications where it is deemed desirable to increase the modulus of the polyisoprene rubber to that of natural, it may be found necessary to increase the acclerator content by amounts up to 20 per cent. Figure 4 shows the properties imparted to polyisoprene by some of the usual accelerators and combinations. Substituted thiazoles, or other types with low melting points, are preferred because of easier dispersion. It has also been found that higher modulus can be obtained by replacing the normally used pine tar with a petroleum product such

TABLE I—TYPICAL PROPERTIES OF RAW SHELL ISOPRENE POLYMER

Color	White
Antioxidant	Hindered Phenolic Type
Structural Purity	92.0% *cis*-1,4 Polyisoprene
Organic Acid, %w.	1.35
Ash Content, %w.	0.40
Intrinsic Viscosity	8.0 dl/g
Weight Average, Mole. Wt.	2,500,000
Mooney Viscosity	55
Density at 77°F.	0.92 gm/ml

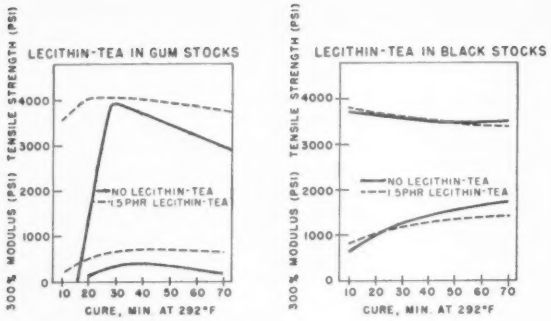

FIG. 5—Effect of lecithin-triethanolamine on Shell isoprene rubber cure rate.

as Dutrex 739. Other normally acceptable methods of increasing the modulus are also applicable.

Gum stocks based upon *cis*-polyisoprene tend to exhibit reversion on over-cure, which has been referred to as a "peaky" cure. This tendency can be largely overcome by adding a mixture of triethanolamine-Soya Lecithin (1.5 phr of 5 per cent triethanolamine—95 per cent Soya Lecithin) to the formulation. The effect of this mixture in preventing reversion is illustrated in Figure 5. On the other hand, reinforced black *cis*-polyisoprene stocks do not exhibit this same tendency to reversion and hence the addition of triethanolamine-Soya Lecithin to such compounds is unnecessary. Except for these compounding modifications, experience has shown that substitution of isoprene directly for Hevea has given satisfactory end results.

Processing

Reference has already been made to the importance of using the proper processing techniques for polyisoprene in order to obtain optimum properties from the finished product. The fundamental cause of the difference in mixing characteristics of *cis*-polyisoprene and Hevea is probably the tendency for the synthetic material to cleave under stress at elevated temperatures. Because of this, the processor may obtain a false impression that the rubber is adequately broken down, due to the "false Mooney" obtained, and hence begin the addition of compounding ingredients too early. When this is done, the polymer obviously is unable to accept the filler properly and poorly mixed batches are obtained with subsequent adverse effects on physical properties.

These difficulties can be overcome readily by the proper use of a mastication or breakdown step before the addition of fillers and other compounding ingredients. Unlike the case of natural rubber, it is unnecessary to perform this breakdown in a time-consuming and expensive separate operation before the normal mixing cycle. In Banbury mixing, the breakdown can be achieved most efficiently by carrying it out as a first step of a normal single pass mixing operation by the addition of approximately 0.25 phr of Pepton 65 to the rubber and mixing this combination until a temperature of about 200° to 225°F. is achieved. Activators, fillers, plasticizers, and other compounding ingredients can then be added and mixed.

Straightforward mill mixing is accomplished by banding the rubber on the mill. After addition of peptizer (as suggested above) mixing is continued for three to four minutes. All subsequent additions are performed in a manner similar to Hevea. Satisfactory dispersion of curatives may be accomplished most conveniently either by blending the curatives into the batch at a temperature moderately above 165°F. or by the use of the masterbatching technique.

In some applications where high green strength is required, it has been found desirable to use a mixture of *cis*-polyisoprene and natural rubber. Preferably, such compounds are made by blending a natural rubber masterbatch with a polyisoprene masterbatch. Alternatively, a single step mixing can be performed. In this case, the polyisoprene portion of the blend should be peptized as described, after which the previously broken down natural rubber portion can be added to it and the blend then compounded and mixed in the normal manner.

It has generally been found that with the exception of the Banbury temperatures most processing operations proceed more smoothly when the temperatures of the equipment—mills, extruders, calenders, etc.—are maintained at a somewhat lower temperature than that normal for Hevea.

Properties of Vulcanizates

The striking similarity in properties between natural rubber and isoprene can be illustrated by an examination of physical properties in practical formulations. In Table II and Figure 6, the formula and stress-strain properties of a gum type compound, such as may be used in elastic bands, are shown, while in Table III and Figure 7, formulas and stress-strain properties of the two materials are compared in a tread stock; in Table IV and Figure 8, similar data are illustrated for a carcass compound.

While comparisons of physical properties are instructive, a more meaningful impression of the potentialities of a new polymer may be obtained by a correlation of these physical properties with various important end use requirements. Before examining various applications in which the material has been evaluated, it should be noted that immediately-foreseeable supplies of *cis*-polyisoprene, as well as other synthetic stereoregular polymers, will be relatively small in relation to total natural rubber availability. For this reason, the average per cent usage of the newer synthetics will be quite small. Under these circumstances, it would appear that they will be used principally as blends with natural rubber, or by themselves in those applications where there is a considerable economic or technical incentive.

One of the principal areas in which large quantities of natural rubber are required because of certain inherent properties—such as low hysteresis—is the manufacture of heavy duty truck tires. Because *cis*-

TABLE II—FORMULATIONS FOR GUM TYPE COMPOUND

Shell Isoprene Rubber	100	—
No. 1 Rib Smoke Sheets	—	100
Zinc Oxide	5.0	5.0
Stearic Acid	3.0	3.0
Antioxidant	1.0	1.0
Sulfur	2.00	2.50
Santocure	0.70	1.00

TABLE III—FORMULATIONS FOR TIRE TREAD TYPE COMPOUND

Shell Isoprene Rubber	100	—
No. 3 Rib Smoke Sheets	—	100
Zinc Oxide	5.0	5.0
Stearic Acid	3.0	3.0
BLE Antioxidant	1.0	1.0
HAF Black	50.0	50.0
Dutrex 739	5.0	—
Pine Oil	—	5.0
Sulfur	2.75	2.75
Santocure	1.00	0.50

TABLE IV—FORMULATIONS FOR CARCASS TYPE COMPOUND

Shell Isoprene Rubber	100	—
No. 3 Rib Smoke Sheets	—	100
Zinc Oxide	5.0	5.0
Stearic Acid	3.0	3.0
BLE Antioxidant	1.0	1.0
FEF Black	30.0	30.0
Pine Oil	5.0	5.0
Sulfur	2.75	3.00
Santocure	1.00	—
Benzothiazyl disulfide	—	0.90
Mercaptobenzothiazole	—	0.20

polyisoprene has essentially identical hysteresis characteristics its potential use in the manufacture of truck tires should be of considerable interest. The similarity between the two products in resilience, heat build-up and tear strength is shown in Figure 9.

Although truck tires have been made commercially using 100 per cent polyisoprene, limited availability of the polymer forced early curtailment of this operation. Unfortunately, these tires were made before a fully satisfactory mixing technique had been evolved, and reliable information on tread wear was not obtained. Subsequently, a considerable number of tire tests have been run using 50 per cent blends of polyisoprene and natural rubber and these treads exhibited wear characteristics approaching those of natural rubber. Similar results were obtained when old carcasses were retreaded with polyisoprene-natural rubber blends.

Another major potential use for *cis*-polyisoprene in tires is in carcasses. Supplementary properties of stock employing isoprene in carcass compounds are shown in Figure 10. Very favorable results have been obtained in factory-scale evaluations of polyisoprene in carcass compounds in blends as high as 50 per cent with natural rubber. To date, the use of 100 per cent *cis*-polyisoprene in carcass stocks has been impractical on a factory scale, the principal difficulty experienced being the failure of the skim-coated stock to maintain satisfactory cohesion when wrapped around the bead. This problem is not due to a lack of tack in the polyisoprene, since good cohesion is experienced when the stock is initially bonded around the bead. However, there is sufficient plastic flow in the rubber that the joint tends to separate upon standing.

Use of isoprene rubber in sidewalls is very promising. The synthetic has shown a distinct advantage over natural rubber because of improved mold flow characteristics, in turn leading to fewer mold defects on the surface of the sidewall. When blended with neoprene, the flow benefits, and good color charac-

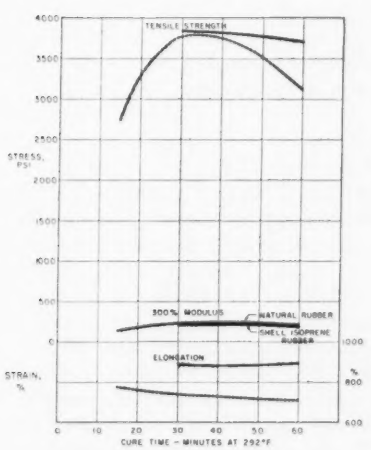

FIG. 6—Stress-strain properties of gum compounds.

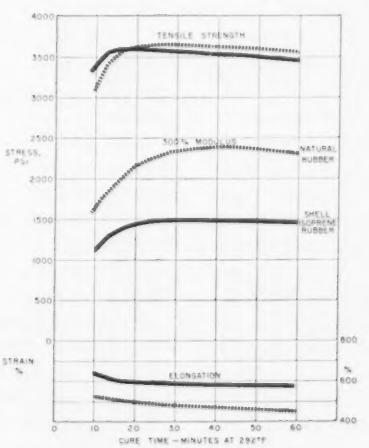

FIG. 7—Stress-strain properties of tread compounds.

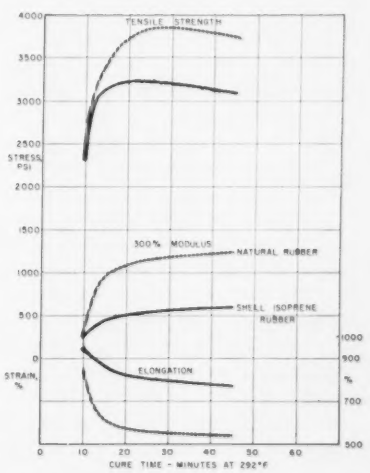

FIG. 8—Stress-strain properties of carcass compounds.

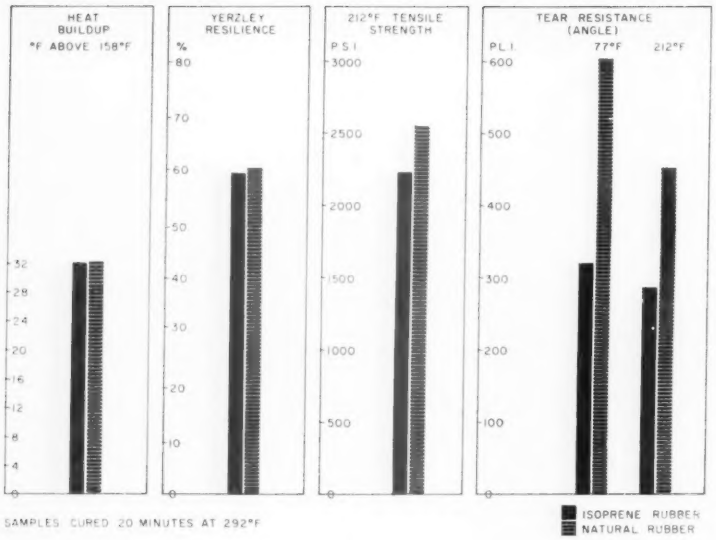

FIG. 9—Supplementary properties of tread type compounds.

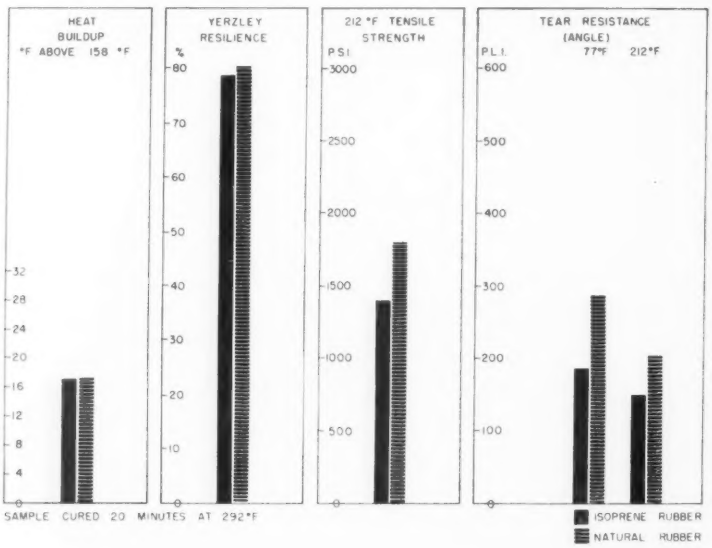

FIG. 10—Supplementary properties of carcass type compounds.

teristics of the synthetic offer considerable promise in white sidewall tires.

In non-tire applications, the excellent color of *cis*-polyisoprene rubber has been a distinct advantage. The light color, along with the other typical properties, are used to good advantage in such items as swim fins, washing machine gaskets, and bumper rings. It is obvious that light color is an advantage only if it can be retained in use. Figure 11 shows the color characteristics of white stocks before and after 40 hours of ultraviolet light exposure, as a function of the per cent light reflectance, thus indicating light stability equivalent to Hevea.

Rubber thread has been successfully manufactured from 100 per cent isoprene rubber as well as from 50 per cent blends with Hevea. Thread containing 100 per cent isoprene exhibits a definite color superiority over that made with Hevea. Freedom from contamination, another prime advantage of the synthetic, is also of paramount importance in this application.

This property is of critical significance in such items as intravenous feeding connectors and rubber bands. The latter in turn benefit from another property unique in the material—greater elongation. Rubber bands made from 100 per cent *cis*-polyisoprene commonly have tensile strengths over 4,000 pounds/square inch and 1000 per cent elongation at break.

One of the requirements for many molded goods is the necessity for excellent compound flow in order to fill intricate designs in the mold cavity properly. Compounds based upon isoprene have markedly superior flow characteristics, as compared with natural rubber. Fewer rejects and sharper definition are obtained when molding products such as drug sundries, windshield wiper blades, and electrical connectors.

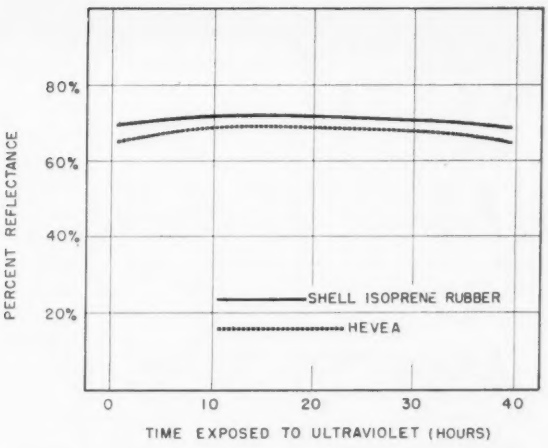

FIG. 11—Color stability of typical white stock vulcanizate.

In addition to excellent mold flow, the manufacture of electrical connectors requires a polymer with good electrical properties. While dielectric strength, volume resistivity, and dielectric constant are essentially equal for both polyisoprene and Hevea, as shown in Table V, the synthetic material holds a distinct advantage in lower water absorption by virtue of its low ash content.

It is evident from these representative practical examples that *cis*-polyisoprene can be used satisfactorily in a wide variety of products where natural rubber had previously been required.

TABLE V—ELECTRICAL PROPERTIES

Property	Shell Isoprene Rubber	Hevea No. 1 RSS
Water Absorption—Mg/cm² @ 158°F.		
20 Hours	0.324	2.214
7 Days	0.766	5.791
14 Days	1.126	7.633
Dielectric Strength—Volts/mil.	.585	.575
Volume Resistivity*		
Dry	—	—
Wet	—	—
Dielectric Constant (1KC)		
Dry	2.59	2.64
Wet	2.69	2.95
Dissipation Factor (1KC)		
Dry	.0002	.0011
Wet	.0004	.0011

*Resistivity exceeds limits of measurability of test equipment. Values reported as greater than 10^{14} ohms/cm.

Test Formulas for Electrical Evaluations

Test Formulas		
Shell Isoprene Rubber	100	—
No. 1 Rib Smoke Sheets	—	100
Stearic Acid	2.0	2.0
Zinc Oxide	5.0	5.0
Benzothiazyl disulfide	1.0	1.0
Zinc dimethyldithiocarbamate	0.1	0.1
Sulfur	3.0	3.0
	111.1	111.1
Cure Time		
Shell Isoprene Rubber	30 minutes at 292°F.	
No. 1 RSS	15 minutes at 292°F.	

Anticipated Future Developments

Cis-polyisoprene is still a relatively new product, and considerable research and development is currently under way to effect improvements in its properties and performance. One such area involves the possibility of reducing the organic acid content. Although necessary for both processing and vulcanization, many applications require only minimum quantities of fatty acids. Maximum usage of *cis*-polyisoprene in these end uses requires a reduction in those fatty acids.

Similarly, there is evidence indicating that improvements in some physical properties such as tensile, modulus, and heat build-up would result if the ash content of the synthetic were reduced further. If this were achieved, it is anticipated that improvements in electrical properties over current satisfactory levels would also be realized.

Although the color and color stability of the present product are considered to be excellent, even further improvements in these characteristics appear possible.

Rubber consumers have been concerned for some time over the potential shortages of natural rubber, as anticipated increased demands appear likely to outstrip possible increased availability. Although greater use of SBR and other well known synthetic rubbers will assist in preventing severe shortages, natural rubber supplies would not be adequate to fulfill the requirements in end uses where its particular properties are essential.

Experience has shown that stereospecific elastomers, such as *cis*-polyisoprene, can be used very successfully in applications heretofore requiring major quantities of natural rubber. With the advent of commercial production of these new polymers, supplies of rubber having the properties required in these end uses will be sufficient to permit the manufacturer to use whichever of the available rubbers best suits his application requirements.

Announced capacities for the production of stereospecific polymers in the U. S., which are expected to be in place by the end of 1962, total about 200,000 tons/year. In addition, Shell and others have announced intentions to construct plants outside the U. S., but in most cases planned capacities were not stated. If the total is assumed to be approximately 100,000 tons/year, total capacity for stereoregular polymers outside Eastern Europe would soon be about 300,000 tons/year. This amount, in addition to anticipated natural rubber supplies, would appear to be sufficient to satisfy estimated demands at least through 1965 and probably somewhat beyond that.

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Quality Control in the Rubber Industry

THE ENGINEERING ASPECTS OF QC

PART 0 | 1 | 2 | 3 | 4 | 5

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BROAD and rapid advances in all branches of science and engineering have resulted in many improvements in the methodology of quality controlling. However, in many companies, the improvement of personnel attitudes and abilities is of far greater importance for improvement of quality and reduction of quality losses than any technological changes. As a matter of fact, even in those plants badly needing better equipment, methods or materials, the prime requirement for such advancement is better interest and knowledge on the part of certain employees. The reader is referred to the "Quality Control Quiz" in Part I of this series (RUBBER AGE, February, 1961). Introspection into self and subordinate attitudes, training, and personnel relations improvements is again suggested.

There are numerous books on the engineering aspects of quality controlling, specifications, laboratory techniques, non-destructive product tests, life testing, process instrumentation and automation of control, and many others. This brief section cannot replace the need for technical training, but it is hoped that it will encourage the technical control executive toward a study-in-depth of those areas of control engineering which may have been overlooked by some rubber manufacturers.

Specifications and Standards

There are two rather conflicting ideas or principles of specifications and one of the problems in industry is the confused intermixing of them. One purpose of a specification is to *specify limits of acceptability*. In this case, the specification defines as exactly as practical the requirements and the permissible variations from some nominal or central values.

However, many specifications do not really define limits. Instead *they present aims or information* on "expected" characteristics. As such they are more descriptive than definitive, and of little use in quality decision-making. Even in those cases where the specification sheet contains exactly worded tolerances, the idea in the mind of the specification writer, user, or both, may be that these are really "general guide lines," and not actually intended to limit acceptance.

A specification should reduce confusion on require-

This fifth and concluding section on quality controlling methods for the rubber company discusses the problems of specifications; visual standards; 100 per cent sorting inspections; automatic process controls; and non-destructive laboratory and life testing techniques.

ments, but many specifications in the rubber industry (unfortunately, also elsewhere) increase misunderstanding by not meaning what they purport, or by vagueness which encourages individual interpretation. Often definite and required limits are intermixed with guide-type information in such a manner that no one is quite sure which is which! This is almost as true of customer-supplier contracts as it is of intra-company technical-production instructions, and in both instances there is reluctance to specify logical and enforceable limits due to (1) lack of engineering knowledge or good judgment (sometimes disguised as "lack of time") and (2) past habits of non-enforcement.

Modern quality control requires definite standards and specifications. These should not be written just for the purpose of having a specification, and certainly should not contain useless details or instructions which can logically and safely be left to operator judgment. In many cases these must represent a logical compromise between quality, and costs or ease of manufacture. In some instances, they must be based on experienced technical judgment, in place of exact, proven facts. However, the executive who believes these compromises preclude definite specifications should realize that if specifications are not defined at a high level, they most certainly will be individually defined at operator or inspector levels. (While the responsible executives and engineers cannot decide if maximum defect size should be 1/16 or 3/32, some personnel are passing 1/4 and others are scrapping 1/64!) It is realized by the writers that there must always be judgment in product or process evaluations and decisions. One major accomplishment of good specifications is to define the extent and level of that judgment.

An impartial, routine quality control audit of specification- or procedure-compliance is suggested to advise management of the extent to which these are enforced. In cases where they are not, review of the specification should be made before change in past operating practices is considered. There are many specifications, the enforcement of which would serve no useful purpose. These should be revised and not permitted to discourage a program of logical specification enforcement.

The establishment of visual standards is an important problem in some rubber companies. These are required in instances where it is not practical to define quality in words and often the problem seems hopelessly complex, with great varieties of standards required. It has been the experience in many plants that the standards need not be so extensive as was first believed. A logical plan usually follows these steps: (1) collect data on types of defects, their frequencies and seriousness; (2) establish management-approved decisions on acceptability; (3) select a small group of representative samples, normally 10 to 50, to illustrate acceptable, borderline, and rejectable standards for major defects; (4) train personnel in these standards, with follow-up reviews and work samplings; and (5) arrange for special decisions to be made promptly by the QC head when necessary.

Many custom or multi-line plants have a wide variety of customer requirements, and much "judgment" is used to determine what is acceptable to each account. In some instances this is necessary, and effectively done by a competent chief inspector. In many other cases both the need and the accuracy of decision are highly questionable. In plants where this is a major item of quality cost, impartial review should be made of customers' actual demands and of inspection practices. Often it will be found that a simple set of standards will replace the need for much individual decision, with improvement in both internal costs and customer acceptance.

Inspection Methods

In recent years there have been many engineering improvements in inspection equipment and methods. These include better lighting, handling methods, inspection recording systems, automatic or semi-automatic gauges and other testing devices; and also improvements in personnel-engineering to better select and train inspectors.

In those factories where there is appreciable 100 per cent sorting or physical testing (visual or gauging), consideration should be given to improvement of methods through industrial engineering, and also to sampling through statistical techniques; for the latter, see Part III of this series (RUBBER AGE, April, 1961).

Good lighting is most important in all inspection work. Older lighting levels are often inadequate, and increases to 200 foot candles, or more, are helpful in many cases. Attention should also be given to background contrasts, color, and harshness (shadow casting) to improve defect detection. For example, black items should not be inspected on a white belt; a blue-tinted light will aid in detecting yellow stains on white rubber articles; a side spot light will frequently better detect small blisters or orange peel than will normal fluorescent light; an operator-adjustable light level may improve morale and attention. Electrical companies in many areas offer free advice or literature on lighting problems to their customers.

The principle of bringing work to the inspector, such as in conveyorized inspections, will decrease physical effort but may cause more monotony and mental fatigue than frequent inspector movement. On repetitive conveyor inspections good engineering must consider both human abilities and human interests. The practice of making jobs simple, automatically encourages lack of attention and interest. Often a high, or variable, speed conveyor requiring frequent inspector activity, making of reports, summoning supervisor on special troubles, etc., will give better quality assurance than a simpler and slower inspection system.

In some instances an inspector may spend a minor portion of his time doing inspection, the bulk being in getting material, recording results, packing items after inspection or other tasks not relevant to his main

purpose. In such cases, improvements in work arrangements, handling equipment, or data recording devices (see Part IV of this series, RUBBER AGE, May, 1961) are all helpful and may also make the job more practical for girls, older men, or handicapped persons, with resultant interest or ability improvements.

In many companies there is interest, but reluctance, regarding incentive systems for inspectors. Actually, there seems to be no special objection to incentive inspections. All incentive systems should encourage good quality as well as high quantity, and this applies equally to production and inspection jobs. It is certainly understandable that any incentive which offers no extra premium for good work, nor penalty for bad, will encourage the employee to think that management is more interested in volume than in quality. The writers have seen many instances of successful incentive for inspection, provided the plan made provisions for some routine sampling verification (usually negligible in cost) and gave either extra bonus for low sorting errors, or penalized for periods of high errors by reverting to day work, requiring re-sorting of rejected lots, etc. In other cases, there have been good inspection incentive records without these safeguards, where management had skill in selection, supervision and encouragement of pride in workmanship.

None of the above should be construed to imply that the writers basically favor piece work systems. Especially for the small company, the best incentive bonus system may be a simple one of profit sharing, considered as earned, not a manager's gift. For any company the best encouragement of job attitude is management and supervisor example, plus an appreciation of the individual employee's abilities. However for those companies with inspectors and production operators in the same union, and operators on incentives, it seems both fair and necessary that inspectors be paid similarly. Not to do so will tend to reduce competence and effort in the inspection group.

Non-destructive Tests

Advancements in the past ten years in radiography, ultrasonics, electrostatic or penetrant particle inspections; as well as developments in air, electronic and optical gauging; in automatic weight sorting; color-sensing and surface finish measurements all have applications in certain areas of 100 per cent, or sample testing, of rubber products.

In radiography alone, increased sensitivity of fluoroscopic equipment, including soft rays of special use on rubber and plastics; availability of isotopes; the reduced operating costs of paper or Polaroid printing; and the speed and sensitivity of xeroradiographic processes have all contributed to spread X-ray type inspection into rubber and allied applications not even considered a few years ago. The rubber company with problems of locating internal defects (blisters, foreign matter, reinforcement alignment, laminations, variations in thickness under stress, etc.) will do well to have its QC manager become familiar with such techniques.

In ultrasonics, there has been even less rubber application to date, partly through unfamiliarity or through the unfavorable preliminary experiences of poorly qualified personnel. Here, as in many areas of quality control, there is a need for men with knowledge both of the company's problems and of the methodology of other industries. Due to the ease with which ultrasonic inspection results can be automatically recorded or used to activate sorting or control mechanisms, the methods seem worthy of further investigation for rubber defect problems.

To date, particle inspections have been confined to hard rubbers. With further developments, or in combination with low temperatures, they may have some broader potentials. (Under such special limitations, it would seem to the writers that even eddy current tests, now so popular on metals, might have applications to certain compounds, farfetched as this may seem at present.)

Dimensional gauging developments, utilizing non-contact air, optic, or nuclear principles, seem especially promising in certain rubber fields. Of these, only X-ray or nuclear thickness (density) checking as a process control is presently in wide use, but the usage seems sure to spread in application to finished product testing as well. Likewise, developments in electronic or hydraulic load cells for precise and rapid weighing offer improved prospects for both feedback controls and product sortings.

Developments in both product non-destructive testing and automatic process controls are certain to expand rapidly and, based on the trend of test and control developments in recent years, it seems likely that the rubber QC manager of the future may be required to have his principal training in physics or electronics, rather than in chemistry, mechanical engineering, or statistics.

Laboratory Tests

Techniques in control laboratory testing of materials, in-process and final product have also advanced, though perhaps not so spectacularly as the above. Here there have been new equipments to measure physical and chemical properties with increased speed and precision, plus new measures of rubber quality characteristics. Details of many of these are well documented in rubber literature. Unfortunately, many of the current tests have had rather limited correlation with performance results and there is a growing feeling among some rubber technical men that the industry needs further new measures of uniformity, to better predict both production characteristics and product performance. The statistical principles of experimental design and correlation should be helpful here in further research into cause-effect relationships of rubbers and rubber processes, and development of better laboratory measures of quality.

Principles of work simplification and planning, equipment maintenance and calibration, measures of

technician or operation error, personnel training, and improvements of records are all of importance in the test laboratory, as in production itself. Especially in the smaller laboratories, very seldom does the chief chemist give adequate industrial engineering attention to improving his service/cost ratio, or have real statistical knowledge of his test reproducibility and true accuracy.

Automatic Controls

To date, there has been less automation of rubber mixing, milling, molding and finishing operations than in some metal or plastic operations. However, it seems certain that there will be major progress in this direction, expedited by both economic and quality considerations. Although especially true for companies producing many thousands of similar items, this may also come about in custom operations, involving similarity at certain phases of manufacture, more rapidly than many expect.

The long range future of quality controlling will, in the writers' opinions, lie largely in the automatic control of operations. The QC manager need hardly concern himself with whether or not there is to be instrumentation and computers, only with who in the industrial family is to be in charge of this control effort. If not done by the QC engineers, it will surely be done by other engineers.

There are today such improved instruments for quality control as nuclear gauges, infra-red radiation pyrometers, photocell or sonic location indicators and electric weigh scales—all automatically adjusting operations in place of former hand methods of control. In many instances, the use of these has been dictated by the need for closer control, rather than desire to reduce labor costs. Tighter specifications, both for tolerances and for reliability percentages, seem certain to encourage further applications.

There are, and always will be, operations that require the skill and judgment capabilities found only in the human brain. But there are many others that need, instead, the repetitive reliability and electronic reflexes of much simpler devices. Automation will not replace brains. Instead it should free brain power from monotonous tasks not worthy of human intellect. The QC manager should keep abreast of developments in automatic controls and apply these logically to problems requiring only the simplest of decisions, but, requiring them with unwavering attention, sensitivity of measurement, and high speed of response.

Performance Life Testing

Service performance standards and comparisons are of critical importance in many rubber items, as in other types of products. The government specifications requiring breakdown, environmental life testing, and other destructive tests on samples have done much to encourage better engineering of actual service requirements and better developmental testing of new designs. Ever increasing competition will further extend this work.

The dual problems facing the quality control head in his evaluation of performance tests are those of (1) correlation of test with actual service and of (2) determining statistical significance on usually very limited samplings. Most life testing is done under accelerated conditions with dubious relationship to those stresses that are encountered in more normal circumstances of use.

Wear tests of tires, impact tests on battery cases, long boiling of baby feeders, and high torque failures on couplings may have little value in measuring end usefulness, either because the quality tested is not the major (or important) type failure, or because the testing method differs significantly from customer treatment. Whenever practical, the QC manager will do well to supplement accelerated testing with actual field usage, which although slower, may be surer in evaluations. Without this, he may find, to his sorrow, that even past correlations are not always reliable with new materials or new designs.

Special Techniques

The statistical methods of life test planning and interpretation have advanced to special techniques. These have been necessary in many cases due both to small numbers of tests and due to special concern for evaluation of the portions of production falling at the extremes of distributions. In much life testing the principal concern is for the worst one per cent (or less), and it is of little comfort to know that 90 per cent of the production will stand up in use. Even the practice of making life performance tests much more severe than actual service is often of little help without engineering assurance that we are measuring the correct condition, and statistical assurance that our estimates of limiting values are safe. There are special courses and texts in life testing, but these normally require a solid mathematical statistics background.

Summary

In every plant the engineering aspects of quality control are many, varied, and important. These may range from inspector incentives to process instrumentation, and the QC group must have knowledge in fields of mechanics, electronics, material handling, lighting, radiography, and many others. Naturally, the QC head cannot be expert in all of these, perhaps not in any; but he must have both the foundation knowledge to recognize possible solutions to quality and quality-cost problems, and also the personal initiative and interest to keep informed on many of the engineering developments and applications in quality controlling—both in his own industry, and in others. In short, he must not be a rubber expert with limited knowledge of quality controlling, but rather a quality control engineer with interest and experience in rubber.

Literature References

Many of the general texts on quality control, referenced in previous sections of this series and noted below in references *(1)* through *(20)* contain some information on the engineering aspects of the subject. References *(3)* and *(4)* and *(21)* through *(24)* are especially suggested for review by the rubber company QC engineer or manager.

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Statistical Design of Experiments for Process Development of MBT

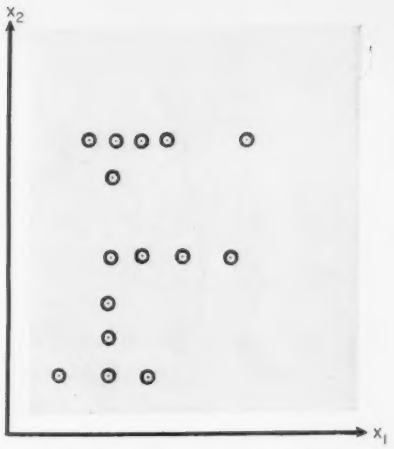

FIG. 1—An array of points showing plotted coordinates of the levels of x_1 and x_2 functioning in an as yet unknown relationship.

By S. A. FRANKEL
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American Cyanamid Co., Bound Brook, N. J.

STATISTICAL tools are having a profound effect upon research, development and production studies in the chemical, textile and metal industries. The specific tool under study here is the use of the methods of statistical analysis in process development and improvement of an existing chemical process.

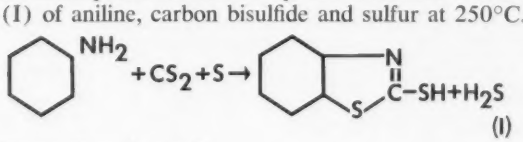
The experimental design and how it was used to estimate the contours of a chemical system is described briefly. The approach of running an experimental design and ultimately estimating the contours of the MBT yield was used to explore empirically the relationship between yield of MBT (response variable) and the controlled variables of time and temperature.

The Chemical Problem

Although mercaptobenzothiazole was known and synthesized as early as 1887 *(1, 2)*, this compound received little attention until 1921 when Sebrell and Boord *(3)* found it to be an effective accelerator in rubber vulcanization. From there to commercialization was a short step requiring only four years to take.

Now mercaptobenzothiazole and its derivatives are among the most important vulcanization accelerators. MBTS, or benzothiazyl disulfide, for example, probably has more end use applications than any other single accelerator.

The problem under study here is the manufacture of mercaptobenzothiazole by the autoclave reaction (I) of aniline, carbon bisulfide and sulfur at 250°C.:



(I)

No medium is used.

There are many different explanations of the mercaptobenzothiazole-forming reaction *(4-14)*. The highest obtainable yields were probably 50 per cent. By using a 15 to 20 per cent excess of carbon bisulfide over aniline and sulfur, however, Kelly *(15)* obtained 75 to 95 per cent yields of mercaptobenzothiazole with and without venting the pressure developed during autoclaving. The mercaptobenzothiazole product was essentially free of anilinobenzothiazole. Kelly's disclosures helped to develop an economical process to produce mercaptobenzothiazole commercially.

Introduction to the Statistical Method. Several methods of attack are available to the research or development chemist for exploring an unknown relationship between some response variable (such as per cent of theoretical yield), and one or more controllable variables (such as time and temperature). The situation in which the response variable, y, for example, is an unknown function of two controlled variables, x_1 and x_2, i.e.:

$$x = f(x_1, x_2) \qquad (1)$$

An experimenter may start to investigate this unknown relationship by choosing initially interesting levels of x_1 and x_2 and observing the response at these points. This maneuver may be followed by other trials at different settings of x_1 and x_2 until the experimenter is satisfied that he has an understanding of the nature of the unknown function.

Plotting the coordinates of the levels of x_1 and x_2 for such an experimental program might give the array of points illustrated in Figure 1.

Experimental programs of this form are often hard to judge because interpretation of the results will vary from worker to worker. Since the program has no clear endpoint, attempts to write a description of the "completed" program require considerable ingenuity

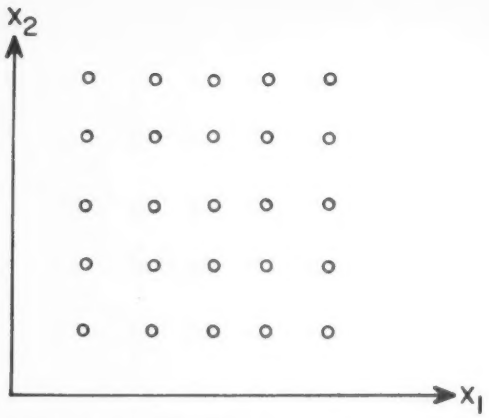


FIG. 2—A systematic analysis of variables x_1 and x_2 over a grid of setting might reveal this pattern.

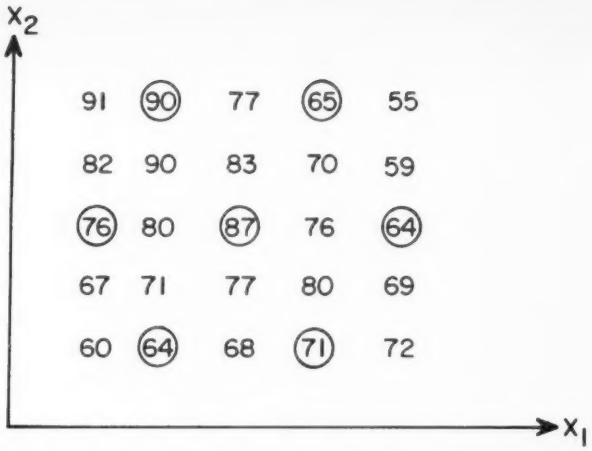


FIG. 3—Hypothesized observations of an experimental program.

on the part of the author if he is to make his efforts appear logical.

There is a more systematic method of exploring the unknown relationship (1). An experimental trial can be run over a grid of setting of the variables x_1 and x_2 and the response observed at each of these points. A plot of the levels of x_1 and x_2 forming such an experimental program might give the array of points illustrated in Figure 2.

If all the observations shown in Figure 3 had been recorded, for example, the response can be mapped by means of a contour diagram as illustrated in Figure 4.

This contour diagram provides the experimenter with an excellent empirical appreciation of the nature and form of the unknown function. Combinations of controlled variables that will give identical yields can be rapidly determined and/or the directions to higher, or lower, responses can be quickly appraised. The "sense" or "feel" for the nature of the response function is now readily communicable to other research workers. These diagrams can often provide hints as to the nature of the true functional relationship between the response and the controlled variables.

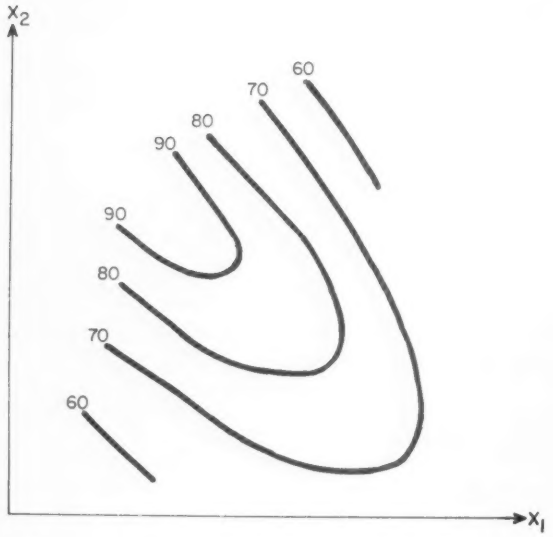


FIG. 4—A contour diagram mapping the responses of Figure 3.

Although mapping an unknown function will answer most of the questions asked of an experimenter, this technique of data accumulation requires a great many experimental trials, particularly if the number of controlled variables is more than two. In this experimental situation, therefore, what is required is a system for estimating the contour lines that does not require a large number of experiments.

If the response variable y is a continuous function of the controlled variables x_1 and x_2 throughout the region of interest to the experimenter, then the function

$$y = f(x_1, x_2)$$

may be represented by a Taylor's Series expansion. The first order series representing the function may be written as:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \qquad (2)$$

In this equation, the coefficients β_0, β_1 and β_2 are, for the moment, unknown.

If the true functional relationship associating y with x_1 and x_2 were:

$$y = 70 + 3x_1 - 6x_2$$

then setting $y' = 70$ gives the equation $3x_1 - 6x_2 = 0$. Everywhere along this line, the response equals seventy units. Setting $y' = 60, 65, 70$, etc., provides a system of parallel straight lines. When plotted together, they give the contours of a plane surface as shown in Figure 5.

If the unknown function is planar (or near planar) in nature throughout the region of interest to the experimenter, then this mathematical model can be used to describe the function. If the response, y,

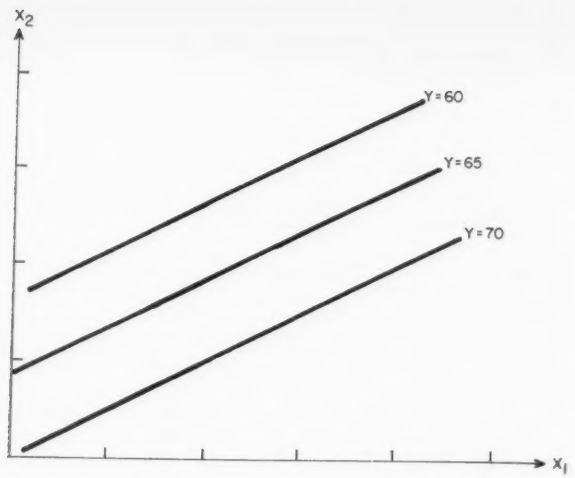


FIG. 5—A system of parallel straight lines results from plotting of the equation $3x_1 - 6x_2 = 0$, and giving to y the values 60, 65, 70, etc.

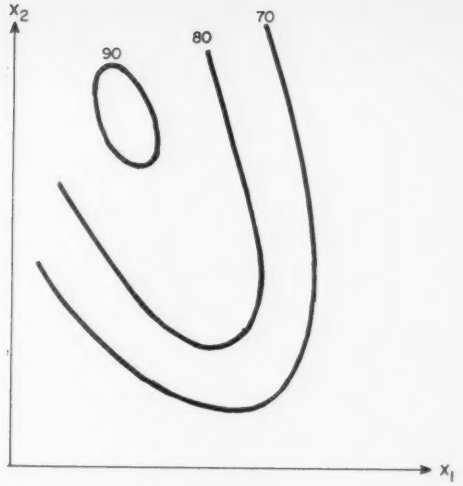


FIG. 6—Estimated contour lines plotted from the predicted value of y as derived from the encircled numbers in Figure 3 and Equation (4).

is recorded at a sufficiently diverse number of points in the space of x_1 and x_2, the coefficients in the mathematical model can always be estimated by least squares. The contours of equal response predicted by this fitted equation then become the empirical representation of the function.

If a response is nonplanar, a second order Taylor's Series expansion can be often used to good advantage:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_{11} x_1^2 + \beta_{22} x_2^2 + \beta_{12} x_1 x_2 \quad (3)$$

If y is set equal to a constant, equation (3) is that of a simple conic in the coordinate system defined by x_1 and x_2. Depending on the size and signs of the coefficients, this equation can generate a circle, ellipse, parabola, hyperbola or even a straight line. If the true contours of the unknown response resemble any of these figures, this mathematical model will be of value. Once again, if sufficient data are available, all the coefficients in this model can always be estimated by using least squares.

Special arrays of settings of x_1 and x_2, called experimental designs, can be used to determine contours of the system under study. These experimental designs require few points and lead to easy least squares calculations. They can also provide all the information necessary for estimating the coefficients and the attendant desirable statistical properties.

To illustrate such an experimental design, imagine that only the seven experimental points illustrated by the circled points in Figure 3 are run. To the observations recorded at these points, the second order mathematical model fitted by least squares becomes:

$$y' = 87.00 - 3.50x_1 + 2.50x_2 - 4.25x_1^2 - 2.56x_2^2 - 4.00x_1x_2 \quad (4)$$

Here, y′ stands for the predicted value of y. Setting $y' = 70, 80, 90$ gives the estimated contour lines illustrated in Figure 6. The estimated contour system now does a good job of approximating the original contour system. This appreciation for the nature of the unknown function illustrated in Figure 4 was obtained from only seven experimental points.

Experimental

Autoclave and Autoclaving Procedure: The autoclave supplied by the American Instrument Company had the following dimensions: inside diameter 3 inches; depth 10⅜ inches; capacity 1,200 c.c. The charge was agitated by a motor-driven rocking device and heated by an electrical jacket. Temperature was obtained continuously on an L&N recorder via thermocouple immersed in the autoclave charge.

The charge was weighed into the autoclave. The autoclave was assembled, connected to a pressure gauge and then heated to the desired reaction temperature (range 220 to 290°C.) in 70 to 100 minutes. Pressure readings were taken by initially creating a

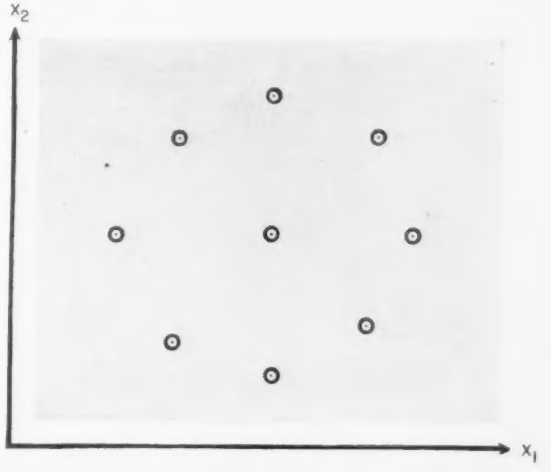


FIG. 7—Proposed experimental "octagonal rotatable design."

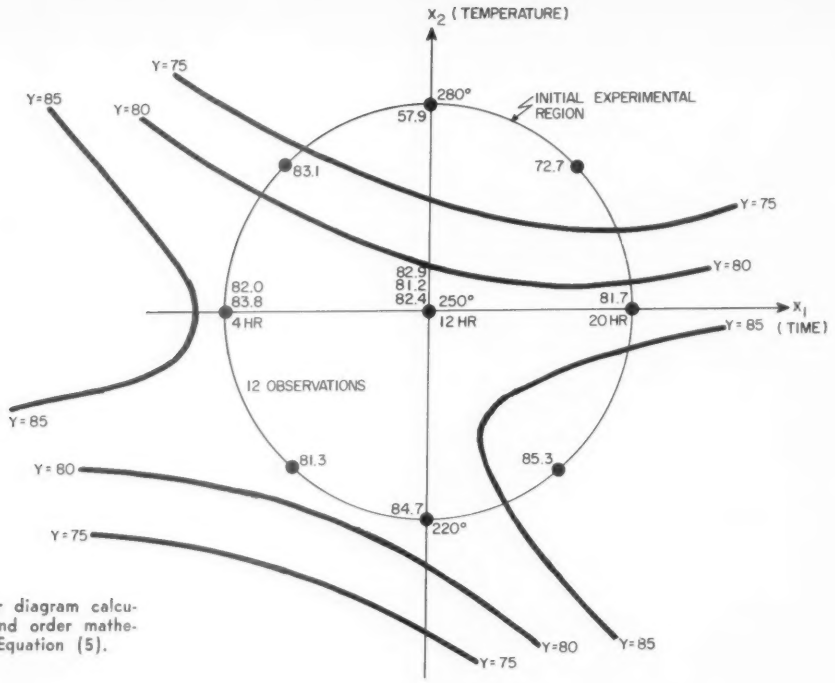


FIG. 8—Contour diagram calculated from second order mathematical model, Equation (5).

nitrogen backpressure to prevent plugging the lines with melt. Generally, pressure build-up was already evident at about 50°C. on the first 30 minutes of the heating cycle. The autoclave was held at temperature for the desired reaction time (range of 2 to 20 hours).

The autoclave was allowed to cool by standing overnight. Residual pressure was noted on opening the autoclave the next morning.

Sodium hydroxide solution was added to the solids. The autoclave was resealed and allowed to shake for one hour to insure complete solution. The resultant solution was removed from the autoclave and assayed for determination of mercaptobenzothiazole yield.

Experimental Design and Statistical Analysis: Certain statistical requirements must be met if a response surface is to be estimated by using a second order mathematical model such as equation (3). A sufficient number of observations must be taken to be able to estimate all the coefficients in the model. The settings of x_1 and x_2 should be chosen so that each observation provides as much useful information as possible concerning the response surface. A valid measure of experimental error and a measure of the "lack of fit" of the fitted mathematical model must be provided.

There are experimental designs, i.e., arrays of settings of x_1 and x_2, known that require very few observations and possess these optimum qualities *(16, 17)*.

The experimental design proposed for the mercaptobenzothiazole study, called an "octagonal rotatable design," is illustrated in Figure 7. The coding mechanisms used to relate the levels of the controlled variables to those of the design variables are:

$$x_1 = \frac{\text{Time (hr.)} - 12}{8}, \quad x_2 = \frac{\text{Temp. (°C.)} - 250}{30}.$$

The coordinates of the design points (x_1, x_2), the associated levels of the independent variables (time, temperature) and the observed responses (yield) are recorded in Table I.

TABLE I—TABULATED RECORDING OF FIRST 12 RUNS

Run No.	Design Levels x_1	Design Levels x_2	Controlled Levels Time (Hr.)	Controlled Levels Temp. (°C.)	Response (Yield) % MBT
1	−1	0	4	250	83.8
2	1	0	20	250	81.7
3	0	0	12	250	82.4
4	0	0	12	250	82.9
5	0	−1	12	220	84.7
6	0	1	12	280	57.9
7	0	0	12	250	81.2
8	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	6.3	229	81.3
9	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	6.3	271	83.1
10	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{2}}{2}$	17.7	229	85.3
11	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	17.7	271	72.7
12*	−1	0	4	250	82.0

*Run 12 was not originally requested, but completed and used in the calculations.

TABLE II—TABULATED RECORDING OF RUNS 13 AND 14

Run No.	Design Levels x_1	Design Levels x_2	Controlled Levels Time (Hr.)	Controlled Levels Temp. (°C.)	Response (Yield) % MBT
13	—1	1	4	280	82.1
14	1	—1	20	220	88.5

TABLE III—TABULATED RECORDING OF RUNS 15, 16, AND 17

Run No.	Design Levels x_1	Design Levels x_2	Controlled Levels Time (Hr.)	Controlled Levels Temp. (°C.)	Response (Yield) % MBT
15	—	—	4	289	84.4
16	—	—	2	265	85.2
17	—	—	2	280	83.2

The second order mathematical model fitted by least squares is

$$y = 82.17 - 1.01x_1 - 8.61x_2 + 1.40x_1^2 - 8.76x_2^2 - 7.20x_1x_2 \quad (5)$$

The contour diagram calculated from this model is shown in Figure 8. Outlines of the technique of these calculations are given by Davies *(18)* and Box *(19)*.

The repetition of the design points $x_1 = 0$, $x_2 = 0$ and $x_1 = -1$, $x_2 = 0$ provided an estimate of the experimental error natural to this study. The standard deviation of a single observation was estimated to be 1.09 per cent. Since the responses ranged between the limits 58 and 85 per cent, this magnitude of the experimental error was not considered too high.

These results indicated that high mercaptobenzothiazole yields would be possible under two conditions: high temperatures with a short time interval, or low temperatures with a long time interval. As a result, two further experiments were tried; (see Table II). These responses, illustrated by crosses in Figure 9, illustrate the utility of the fitted contour lines. Re-estimating the coefficients in the model with these new observations included gave

$$y = 81.63 - 1.92x_1 - 7.46x_2 + 1.99x_1^2 - 7.69x_2^2 - 8.82x_1x_2 \quad (6)$$

To examine further the possibility of high mercaptobenzothiazole yields at short time intervals and high temperatures, three more experimental trials were conducted. (See Table III).

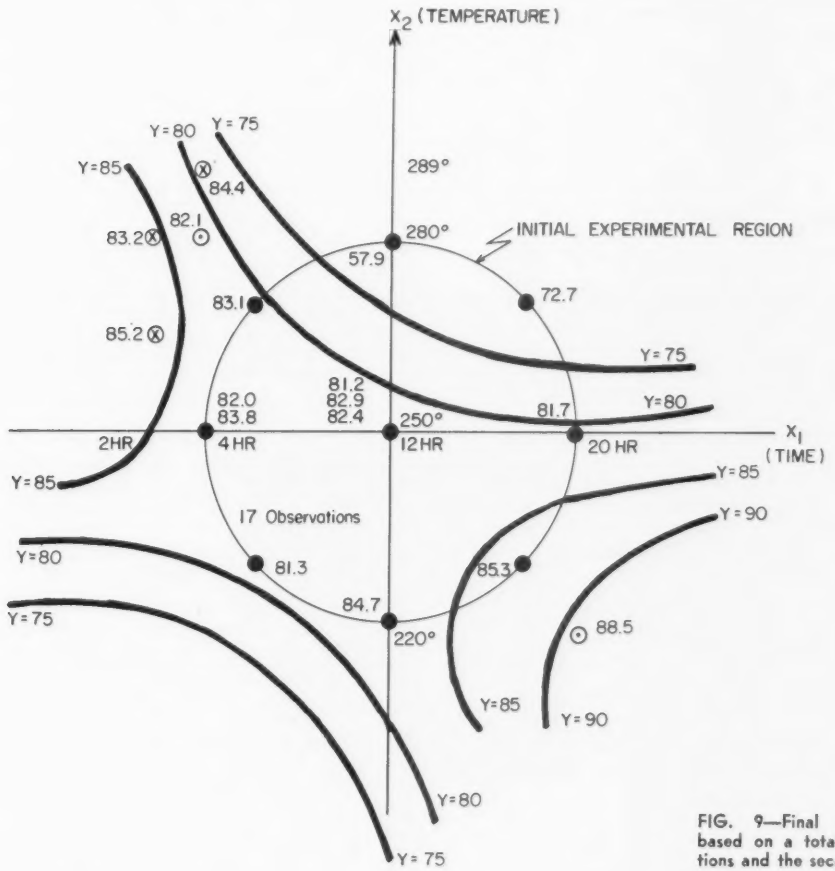


FIG. 9—Final contour system based on a total of 17 observations and the second order model.

As before, the model was refitted for the array of 17 runs giving

$$y = 81.11 - 2.09x_1 - 6.76x_2 + 1.15x_1^2 - 5.41x_2^2 - 9.49x_1x_2 \quad (7)$$

The additional observations did not materially change the form of the fitted equations. The final contour system based on all 17 observations is shown in Figure 9.

The contour representations of the response of mercaptobenzothiazole to changing levels of temperature and time indicate that:

(1) Yield as a function of time and temperature is not a simple planar response, but requires a second order model.

(2) Simultaneous high levels of temperature and time have a deleterious effect on the response (yield).

(3) Low levels of temperature (about 220°C.), if held a long time, will generate high mercaptobenzothiazole yields.

(4) A good possibility exists that medium to high temperatures (250° to 280°C.) over a short period of time (3 to 5 hours) may also produce high mercaptobenzothiazole yields.

(5) The region defined by the limits of 4 to 8 hours and 235° to 255°C. encloses an area where the response is almost everywhere equal to 82 to 83 per cent of theoretical.

ACKNOWLEDGMENTS

The author wishes to express his gratitude to Drs. R. H. Ebel, A. G. Hill and J. S. Hunter for their encouragement and helpful discussions throughout the course of this work.

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Coming Soon . . .

Lignite Tar Fractions as Antioxidants and Plasticizers for Rubber—By R. A. Clark and W. J. Mueller, Battelle Memorial Institute, Columbus, Ohio.

The findings of this investigation, heretofore unreported, indicate that certain of the fractions from lignite tar may prove useful as antioxidants for natural rubber and SBR and as plasticizers for SBR, and neoprene and nitrile rubbers.

Incorporation and Dispersion of Ingredients in Rubber—By I. Drogin, United Carbon Co., New York, N. Y.

A complete, step-by-step analysis of materials and the factors influencing their mixing characteristics. The article also contains a sequential-type chart showing Banbury procedures (with times) for dry mixing various types of stock.

Abrasion Testing on a Modified DuPont-Grasselli Abrader—By Z. Rigby, Rubber Research Association, Haifa, Israel.

This article describes a simple and practical laboratory method of studying abrasion of tread, and other compounds, and the relation between compounding and processing on the one hand, and abrasion resistance on the other.

PLUS R/A SPECIAL INDUSTRY REPORT

A Leased Staff: Temporary Help Can Pay Off in Savings—By John H. Frank, Manpower, Inc.

Temporary help can save the rubber manufacturing firm money by permitting flexibility in payroll without long-term commitments. Case studies show how.

FIG. 1—Special Air Force order for hose being made up in the production department.

SPECIAL INDUSTRY REPORT

New Simplified Production Control System

By H. S. MILLER

Superintendent, Production Control, Rubber Div., Hewitt-Robins, Inc. Buffalo, N. Y.

► A tanker loaded with jet fuel was waiting offshore near an airbase in Turkey when the order for 500 feet of 10-inch hose in 25 foot lengths it needed arrived at the Buffalo plant of Hewitt-Robins. When this rush order arrived it had to be translated into some 40-step factory specification sheets.

Previously, before the fabrication could even begin, these specifications would have had to have been individually typed, then proofread and corrected. Probable elapsed time: half a working day. Instead, however, a new system using office copiers has been instituted for preparing these factory specifications and a potential bottleneck at this point has been eliminated. On the Air Force order, shown being made up in Figure 1, the system enabled the shop to begin work almost immediately; specifications were completely prepared in a matter of minutes.

The marine hose is only one of the products produced by the Rubber Division of Hewitt-Robins. Each product, from small molded rubber items and 3/16-inch twin welding hose to 18-inch oil suction and discharge hose for tankers, requires its own set of factory specifications. Tanker hose is almost always made on a custom basis. It has been the most difficult problem in production control because specifications for 35 to 40 steps have to be specially written. Our technical department writes these specifications, listing the data on all diameters for any one type. For example, we might have specifications for one kind of hose in 4-, 6-, 8-, 10-, and 12-inch diameters.

When we formerly received an order for that hose in a 10-inch diameter, we had to excerpt the right data for that diameter from the mass of specifications for all other sizes. This data then had to be transcribed each time onto a factory specification sheet, some of which run to three or four pages. It would take a clerk typist four hours to finish the job, often longer. Then each sheet had to be proofread and corrected.

Under our new system, which cuts this operation down to about 15 minutes, a master file of separate specification sheets is maintained for each product and in every size it can be made.

FIG. 2—Master factory specification sheet, and strip of paper on which are typed customer's name, relevant dates, and technical data are combined to make matrix.

These are typewritten originals provided by the technical department and coded with a product number. A four-inch space across the first sheet is left blank.

When a customer's order reaches the production control office, it carries the product number involved, a brief technical description of the product, the data involved, the date promised, and the date production is scheduled.

The master specification sheet, being processed in Figure 2, is then pulled from the file. The customer's name, and dates and technical description are transcribed from the order form onto a strip of paper which is laid over the blank portion of the master specification sheet.

The clerk typist then produces eight copies of the specification sheet including the variable information on a Verifax Copier. Copies go to the various production departments, the shipping room and the time study department.

Under the old system, stenographic help was almost regularly called in Saturdays and often at night in order to keep up with the work. We have no concrete figures on time or money saved with the new setup but we no longer require overtime typing.

From three to six orders per day for special products are handled with this system. Other departments, concerned with standard products, use the master specification file and make Verifax copies 50 to 75 times a day. Photographic copies are also an aid when making changes in a set of specifications. Formerly, the entire duplicating machine master needed rewriting. Now, the new specifications in typewritten form serve as the new master sheet for making Verifax copies.

EDITORIAL

Product or Package?

► We hold ourselves to be a friend of the ACS Division of Rubber Chemistry and it is in this light that we address ourselves to a matter which has been of concern to us for many years.

It is our understanding that Rubber Division meetings are held so that technical information may be imparted and received; so that individuals have an opportunity to exchange not only greetings, but ideas, and so that each speaker has an interested and attentive audience. We maintain that current Rubber Division meetings are not responsive to these aims. Division meetings are pleasant enough —perhaps too pleasant. The state of the world in which we live, however, demands that we bend every effort to meet our technical obligations first, our social obligations second.

Let us take a typical Rubber Division meeting. An impartial observer at a technical session might be struck by rather poor attendance (although this could be due to paper quality) and the fact that speakers are often forced to compete with a babble elsewhere in or near the meeting room. He might note that "job hunting" is getting to be a major preoccupation. He might also bear witness to the fact that hospitality suites are getting less hospitable and more frenzied. The impartial observer might even come to the conclusion that there may be a better way to do things.

At this point we should explain that we too like a "good time", that we too like to laugh it up with the boys, that we too like our moments of relaxation. But a small voice somewhere tells us that we all may be forgetting our purpose—that the package may be getting more important than the product. To rectify what we consider to be a serious situation, we offer these thoughts:

Decorum: When the Rubber Division meets with the parent society, guards are posted at the doors of meeting rooms so that only those persons wearing a proper badge are admitted. Why not have a similar arrangement when the Division meets by itself? Such an action would tend to force registration and would go a long way toward the maintenance of proper decorum in and near meeting rooms.

Hospitality Suites: We are of the opinion that this entire subject should be rethought. It should be evident that suppliers are vying with each other for attention with the end result a total blur. It may be that the Rubber Division membership will wish to consider one of these or other alternatives:

(a) A joint hospitality suite to which all suppliers will contribute. One or two of the local rubber groups have been operating under this system quite successfully.

(b) A method by which "official sanction" is given to the hospitality suites. The Society of Plastics Engineers, for example, has a ruling under which those companies which wish to provide a hospitality suite must register to do so with society headquarters. The company pays a fee based upon the size and type of its organization with the fees averaging about $200. For this sum, the company receives official recognition of its suite. The suite is noted and publicized in all official publications. Companies which do not register cannot provide a hospitality suite. It is maintained that this official registration of suites provides a proper atmosphere and does much to curb excesses.

Job Hunting: We do not decry this activity. We do feel it should be channelled properly so that it will work for the benefit of all. Some organizations, including ACS itself, utilize an "employment desk" where a service is provided for all members of the organization. This, of course, raises the question of who is to be charged with the responsibility of running this service. A disinterested executive secretary has this as one of his functions. Has the time come for the Rubber Division to engage the services of a professional executive secretary? Regulated job hunting will not detract from technical meetings and will enhance the orderly operation of all activities.

Technical Sessions: These sessions may themselves have to be reoriented. From an instructional point of view, educators recognize that a lecture is probably the poorest way to get an idea across. It is possible that smaller, round-table, shirt-sleeve sessions are more to be desired. If we must accept the premise of formal paper readings, however, there may be better ways to organize them. Instead of reading a full paper, authors might choose to offer condensed versions of their manuscripts—providing that the audience had a full copy of the paper available.

We know that the Rubber Division has been giving much thought in recent years to providing preprints of technical papers. Providing preprints poses many problems—the cost factor for one. Several methods are employed by different organizations so that preprints may be provided. In one case, the cost of preprinting is borne by increased membership dues. In another case, preprints are sold with registration. Perhaps the registration fees for hospitality suites (noted earlier) could be utilized for the preparation of preprints.

Preprinting itself is not unique. Other divisions of ACS do this as a regular practice. The Petroleum Division, with which the Rubber Division will soon meet in joint session, provides this service. Many other organizations have been providing preprints for years. Of course, preprinting itself poses still another problem for those charged with the responsibility of running the Rubber Division. We must return, then, to the matter of an executive secretary so that elected officers are not saddled with additional details. However the mechanics may be worked out, this matter of preprinting is perennially before us. True, preprints are only one method by which technical sessions could conceivably be improved, but it is a method worthy of consideration.

In these few paragraphs we have touched on only some of the factors which tend to limit a truly successful Rubber Division meeting. We are aware of many other thoughts on the subject, such as holding one meeting a year instead of two so that papers for presentation can be more effectively screened. Or of limiting meetings to two rather than three days so that fewer and better papers will be presented. Certainly, there are many more facets to the problem.

We feel, however, that by touching on some of these subjects we may give some stimulus to new thoughts and new approaches. We are of the opinion that if we do not take corrective measures the day will come when companies will have to be cajoled into sending their people to Rubber Division meetings. We respectfully submit that the time has come for realism. We respectfully submit that the time has come for action.

NEWS REPORTS
and industry activities
JUNE, 1961

Goodyear Develops New Natsyn Process

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced that it has developed a process for producing Natsyn synthetic rubber at a maximum cost of 25c a pound, well below the current prices of natural rubber. The competitive price is made possible, the company says, by a new process for making isoprene, a basic material used in the manufacture of its Natsyn rubber.

The new isoprene process, the result of research conducted by Goodyear and Scientific Design Co., Inc., New York, N. Y., was described in a paper delivered at a joint meeting of the American Institute of Chemical Engineers and the Chemical Engineering Institute of Canada. The paper, "Isoprene from Propylene," authored by V. J. Anhorn and K. J. Frech of Goodyear, and Gerson S. Schaffel and David Brown of Scientific Design, did not reveal details of the process, but Goodyear said that it uses propylene as the source for the isoprene. Propylene is available in billion pound quantities as an oil refinery by-product.

Equivalent Cost Factor

Goodyear also stated that it can produce isoprene at a cost equivalent to or less than that of butadiene. Butadiene is the basic raw material used for the production of polybutadiene rubber, one of two synthetic-naturals that are showing promise as replacements for natural rubber. The other synthetic, polyisoprene, according to rubber chemists, can be used in all applications of natural rubber, while polybutadiene is effective in about half of such applications. Polybutadiene, however, has characteristics such as high abrasion resistance, which make it preferred in such high-tonnage uses as tire tread rubber.

Goodyear will produce isoprene by the new process, as well as its Natsyn polyisoprene rubber and Budene polybutadiene rubber at its $20,000,000 plant in Beaumont, Texas, now under construction. It is expected to be in production by early next year.

Commercial Production

Both polyisoprene and polybutadiene rubber are being produced commercially. Shell Chemical Co., a subsidiary of Shell Oil Co., manufactures polyisoprene rubber and markets it at 28.1 cents a pound in truckload or carload lots. Firestone Tire & Rubber Co. has begun to produce Diene, a polybutadiene rubber, and is marketing it at 31½c a pound in truck or carload lots. It is also produced by Phillips Petroleum Co.

"Button Pushing"

► A recent random survey by correspondents of the *New York Times* in various offices and factories where automation has been introduced indicated that most of the "button pushers" liked their new jobs but that many were worried how long they might last.

The survey indicated that in Topeka, Kansas, where the most modern developments in tire making have been installed by the Goodyear Tire & Rubber Co., a steady expansion in employment has kept most workers from feeling the anxieties that oppress many workers in outmoded tire plants in the Akron area.

Nevertheless, many workers, including one who runs a tire-shaping device, believe they can see the handwriting on the Topeka plant wall. They report that new presses can do with five men the task it now takes thirteen men to perform. Within five years they expect machines to take over the whole tire process without human help.

Investigates Bidding By Rubber Companies

► New York State Controller Arthur Levitt has launched an investigation of possible antitrust law violations in a state purchase of $336,000 worth of tires and tubes. The transaction, he reported, produced identical bids from five major rubber companies in forty-five of forty-seven purchase categories. Controller Levitt announced that he would forward to Attorney General Robert F. Kennedy and to the New York State Attorney General a report on the purchase contract, which involved what was to be competitive bidding on enough tires to supply the state for a year. The major part of the contract involved bids on ten sizes of passenger car tires, twenty sizes of bus and truck tires, and seventeen sizes of tubes.

Identical Bids Received

According to Controller Levitt's office, identical bids for all but two of these forty-seven categories were received from the General Tire and Rubber Co., Firestone Tire and Rubber Co., B. F. Goodrich Co., Goodyear Tire and Rubber Co., and United States Rubber Co. Goodyear was awarded the truck and bus tire contract and the tube contract for a total of $247,000, while Goodrich received the passenger tire contract for $89,000. A spokesman for the Office of General Services, Albany, N. Y., successor to the agency that awarded the contract, said state officials did not know on what basis one identical bidder had been selected over another.

► The U. S. Navy's Bureau of Ships has awarded Quantum, Inc., Walningford, Conn., a twelve-month research contract for development of elastomeric materials with self-lubricating properties.

1960 Synthetic Rubber Production Increases

► The U. S. Tariff Commission reports that synthetic rubber production in 1960 reached 2,952 million pounds, up slightly from the 2,825 million pounds produced in 1959. Synthetic rubber sales in 1960 amounted to 2,551 million pounds, valued at $698 million, up from the 1959 figure of 2,601 million pounds, valued at $693 million.

According to the Tariff Commission, the output of rubber processing chemicals in 1960 declined 5 per cent, totaling 200 million pounds, as compared with 210 million pounds in 1959. The decline was attributed to a smaller output of cyclic and acyclic accelerators.

Sales of rubber processing chemicals in 1960 amounted to 153 million pounds, valued at $101 million, compared with the 1959 total of 159 million pounds, valued at $102 million.

Production of cyclic rubbers in 1960 amounted to 2,283 million pounds, compared with 2,213 million pounds in 1959. Sales amounted to 1,949 million pounds in 1960, valued at $469 million, compared with 2,006 million pounds, valued at $463 million, in 1959. In the commission's report, data are shown separately for polyurethane type rubbers, with production totaling 6.8 million pounds.

Production of acyclic rubbers in 1960 amounted to 669 million pounds, compared with 613 million pounds in 1959, an increase of 9.1 per cent. Sales in 1960 amounted to 602 million pounds, valued at $229 million, compared with the 1959 figure of 594 million pounds, valued at $230 million. Data for silicone type rubbers were shown separately, with 1960 production being 4.9 million pounds.

Production of cyclic rubber processing chemicals in 1960 amounted to 171 million pounds, compared with 178 million pounds in 1959. Sales totaled 130 million pounds, valued at $85 million, compared with 134 million pounds, valued at $86 million, in 1959.

Production of acyclic rubber processing chemicals, chiefly accelerators and peptizers, amounted to 29 million pounds in 1960, compared with 32 million pounds in 1959. Sales in 1960 amounted to 23 million pounds, valued at $16 million, compared with 25 million pounds, valued at $16 million, in 1959.

J. W. Berg

C. R. Simpson

Fill Posts at Harwick Standard

► Harwick Standard Chemical Co. of New Jersey has appointed John W. Berg as manager of its Trenton, N. J., office. Assisting Mr. Berg will be C. R. Simpson, who was transferred recently to Trenton from the firm's home office in Akron, Ohio. Mr. Berg received his degree in chemistry from the University of Pennsylvania. As former Pittsburgh district manager for Pennsylvania Industrial Chemical Corp., he has had broad experience in both the rubber and plastics industries. Mr. Simpson was graduated from Baldwin-Wallace College with a degree in chemistry. He has had experience in various phases of rubber chemistry and chemical purchasing at B. F. Goodrich Co., and served as Harwick's technical sales representative in Ohio, West Virginia, Kentucky, and western Pennsylvania before his present appointment.

New Prepolymer Process

► A process for making a prepolymer for urethane rubbers is in the final stages of development at the Rubber Chemicals Department of American Cyanamid Co., Bound Brook, N. J. According to Dr. J. G. Affleck, department manager, the Cyanamid process is the company's own and the result of a joint effort between process and product development and application research. Cyanamid has been investigating the urethane rubbers for several years. "Our initial product entry," Dr. Affleck states, "will offer several important product and processing advantages over other commercially available prepolymeric materials. With our product," he continued, "a processor can manufacture a rubber as soft as a crepe rubber sole or as hard as linoleum by merely selecting the appropriate curative." Cyanamid plans to offer five different curatives for use with its prepolymeric product.

Builds Research Center

► National Lead Co., New York, N. Y., has begun construction of a new multimillion dollar research center in East Windsor Township, near Hightstown, N. J. Located on a 250-acre site, the research center will comprise separate units designed to provide specialized facilities for research and development work for the company's major divisions. Construction of the first unit of the center is scheduled for completion in the summer of 1962. The building will contain 87,000 square feet of laboratory, office and service space. Four wings will be devoted to research and development in the fields of plastics and resins, nonferrous metals, paints and pigments, and lead chemicals. The building will also include a cafeteria and a library, as well as service and storage facilities. The present staff at the company's Brooklyn Research Laboratories will be transferred to the new center.

Speaks With Dr. Leslie Bateman

At a special conference held at the New Weston Hotel in New York City, Dr. Leslie Bateman, director of the Natural Rubber Producers' Research Association, outlined for the editors of RUBBER AGE his views on natural rubber; its present position and its role in the future. The questions asked of Dr. Bateman and his direct responses, follow:

Question: Can you tell us something of your current research activities; where is emphasis being placed?

Answer: The Natural Rubber Producers' Research Association's program comprises (1) biological and biochemical work concerned with how rubber is formed in the tree; (2) fundamental and applied studies of the chemical reactions important in the processing and use of rubbers, *i.e.* mastication, vulcanization, and oxidation; (3) similar studies of those physical properties which determine service performance and life, *i.e.* elasticity, tear, flex-cracking and other failure and fatigue phenomena, and abrasion, and (4) technological investigations designed to effect improvements in the use of natural rubber, quality and cost-wise.

Some effort is also directed to exploring new uses for rubber, but since at the present time every pound of natural rubber which is produced is consumed, this activity is at a research level with possible future eventualities in mind. It seems more worthwhile now to try to consolidate the use of natural rubber in present established applications and direct extensions than to seek radically new outlets which could only be developed at the former's expense.

As the NRPRA is a co-operatively supported institution, not tied to a commercial firm and thus without any control at all on the marketing and sale of the product it is promoting, it is felt that the widest and most effective impact of its work can be made by making this *complementary*, rather than supplementary, to that of industry proper.

Question: What is the future you see for SP rubber?

Answer: I see the SP rubbers forming a valuable group of specialty rubbers, offering a worthwhile outlet to a producer of good quality rubber (in somewhat the same sense that sole crepe does) and being a decidedly advantageous product to manufacturers of special extruded and calendered goods. As materials giving improved and more economical processing without loss of the excellent qualities associated with natural rubber, the SP rubbers are unquestionably in a class by themselves.

Question: Is there merit to the suggestion that the future of natural rubber lies in the field of specialty rubbers? Over the long run, will it continue to be important as a general purpose polymer?

Answer: There seems to me to be an almost paradoxical twist in this question. Natural rubber is, of course, the supreme general purpose elastomer; no other rubber has the combination and balance of properties—strength, tear and abrasion resistance, resilience, adhesion, processability — which allows it to be used to such advantage over such a wide range of applications.

However, since the over-all consumption of elastomers is increasing faster than the production of natural rubber, it is inevitable that although more natural rubber will almost certainly be used in absolute amount, less must be used in relative amount. This, in turn, implies that greater selectivity will be exercised in its use and that it will increasingly be employed where its special qualities are most desired. Nevertheless, one can hardly envisage natural rubber ever being a specialty rubber in the sense usually understood.

Question: Has the introduction of the stereo-specific rubbers brought about any changes in research activities?

Answer: The activities listed as (2), (3) and (4) in the answer to your first question retain their pertinence and importance irrespective of the new competitive situation created by the introduction of the stereo rubbers. But since the new element in this situation is a greater equivalence quality-wise, the economic factor looms larger and directs emphasis to the need to still further enhance production efficiency for natural rubber. Apart from more active agronomic research along broadly conventional lines, increasing weight is likely to be given to finding out how that biological factory, the rubber tree, works and how it can be made to do so with greater and more controlled productivity. In another direction, increasing attention is being given to the blending of natural with the stereo rubbers—to promote their use in a complementary rather than in a strictly competitive manner.

Question: Are research activities in natural-synthetic combinations bearing fruit? What are the commercial possibilities of these combinations?

Answer: The special and really quite remarkable qualities of natural rubber-*cis*-polybutadiene blends have recently made headlines. NR-SBR blends are already widely used commercially, both in latex and solid rubber applications, and blending NR with certain other rubbers also shows promise. Superior processing rubbers, notably the concentrated form PA-80, can be used with advantage in several synthetic rubbers.

Question: Has the commercial acceptance of the Heveaplus rubbers been satisfactory, or is it still too early to tell?

Answer: We have been well pleased with the technical merits of these materials; they are perhaps the best "resin rubbers" available today. With the Natural Rubber prices prevailing over the past few years, however, the plastic industry has been

able to supply somewhat similar products more cheaply. Because of this price differential we have not had the commercial acceptance of Heveaplus-MG that we should have liked. Nevertheless, even under these conditions, Heveaplus-MG still finds small but regular outlets in certain specialized applications, and more recently, their use as adhesives has begun to find favor.

Question: Have your recently organized technical service activities brought to light any specific areas where research will be profitable?

Answer: None of which we were unaware. Our Technical Service has re-emphasized for us that interest in the better use of NR continues to range very widely. Better ageing compounds, better ozone resistance, better cracking and flex resistance, cheaper formulations meeting the property requirements, and behavior of blends form the basis of the majority of queries.

Question: Do you contemplate a major research effort in any one specific area in the near future? Why?

Answer: Without attempting to answer this question quite directly, I feel that the two topics mentioned in my answer to the question on stereo-specific rubbers are likely to receive special attention — for the reasons indicated.

Question: Is any work going forward on natural rubber masterbatches?

Answer: Some work on these masterbatches has been carried out. However, its exploitation presents some difficulty and the following considerations should perhaps be borne in mind. First, the preparation of such masterbatches on a substantial scale, which is the only worthwhile scale to contemplate, requires a large unit operation so as to ensure uniformity and consistency in quality, as well as economy in preparation. The smaller unit scale of NR as compared with SR production is disadvantageous in this respect. Secondly, cost considerations dictate that non-rubber components of masterbatches, such as carbon black, be available locally, rather than be involved in two-way transport. Thirdly, any masterbatch must not be subject to a differential tariff in consuming countries—which may well not be the case. Fourthly, marketing arrangements must be favorable—which again can hardly be said to be so for products outside the ordinary grading system.

Seen (left to right) are Dr. Leslie Bateman; B. J. Kotsher, editor of RUBBER AGE; S. Ralph Dubrowin, Natural Rubber Bureau; and H. C. Bugbee, president of the Natural Rubber Bureau.

Dr. Bateman (left) is interviewed by Mr. Kotsher.

M. E. Lerner, publisher of RUBBER AGE, discusses the world position of natural rubber with Dr. Bateman.

For the present, it seems advantageous for the NR producers to concentrate on supplying better and cheaper conventional rubber, although the market not the producer determines the price, and for the further development of compounding procedures to allow the manufacturer to make the best use of this in the most flexible manner.

Question: To your mind, what will be the position of the natural rubber industry, say, ten years from today?

Answer: The pattern of the rubber industry now emerging seems likely to be that which will prevail for a long time, certainly for 10 years. With NR, SBR, butyl, *cis*-PI, *cis*-PB, and ethylene-propylene rubbers in the picture, the possibilities for large volume general purpose rubbers seem practically exhausted. The new competitive pressures which will develop will affect all these rubbers, and not only be directed at NR, which will certainly continue to be marketed profitably at prices easily competitive with synthetic rubbers—a situation which will bring the producers more profit per acre, although less profit per pound.

Globally, NR is likely to be used to the limit of its production, which will probably be some 20 to 25 per-

cent greater than at present and from plantations with a higher average production efficiency, although in some countries, the U.S.A. for example, its usage is likely to diminish somewhat. The pattern of production will change considerably, with Malaya becoming far and away the main producing territory, a possible reflection being a smaller ratio of lower to higher grades which will come on the market.

One impact of the stereo-rubbers may be to induce changes in the long-standing manner of supplying NR—some being made available in similar form and package to *cis*-PB and *cis*-PI. The urge to greater uniformity and quality-control in the raw materials will be intensified by increased automation and such, like in the manufacturing industry. In short the NR industry will be confronted with problems of adaptation to conditions of change greater than it has had to meet before. The industry is aware of these problems, is facing up to them, and in so doing will certainly remain one of the major industries of the world.

DuPont Develops Baymal

► Baymal colloidal alumina, said to be a versatile basic chemical, has been developed by the E. I. du Pont de Nemours & Co., Wilmington, Del. According to DuPont, Baymal is so versatile that in one form it is hard enough to machine steel or cut glass, while in another form it can be used to improve the smoothness of a skin lotion. The material is a white, free-flowing powder, consisting of clusters of minute fibrils of boehmite alumina. Baymal is said to have the following combination of properties: it is a water dispersible powder; it consists of fibrillar particles; particles are small and have a high surface area; when dispersed in water, the fibrils assume a positive charge; it is hydrophillic and organophillic; it has a low toxicity.

One of its suggested uses is in polymer reinforcement, and is most likely to be obtained where Baymal can be dispersed to its ultimate fibrils throughout the polymer. In the case of anionic polymeric and elastomeric latices, incorporation may be achieved by coagulation of the latex with a solution of Baymal followed by filtering, drying, and milling to effect maximum dispersion. Foam rubber can be reinforced by dipping it into a dilute Baymal dispersion and drying.

Dinsmore Retires from Goodyear

► After nearly a half a century of service to his company and the rubber industry Dr. Ray P. Dinsmore, vice-president, a member of the board of directors, and head of research and development at the Goodyear Tire & Rubber Co., retired from the company on May 1. The retirement of the internationally-known authority on both natural and synthetic rubber preceded by two months his 47th anniversary with Goodyear. He will continue to advise the company on research and development projects on a consultant basis.

A native of Tewksbury, Mass., Dr. Dinsmore graduated from the Massachusetts Institute of Technology in 1914 with a degree in chemical engineering. He joined Goodyear that same year in its Experimental Department and was the forerunner of the company's present 1,700-member research and development staff.

"A young man could hardly have entered a business when more exciting developments loomed on the horizon," Dr. Dinsmore states. "Rubber science had only taken a few short steps forward then, and there were many things to be done."

After serving at the Bowmanville, Ontario, and the Los Angeles, Calif., plants, Dr. Dinsmore returned to Akron in 1921 as chief chemist and research director. At this period Goodyear was primarily a manufacturer of tires and industrial products. Now, in addition to these two fields, the firm is one of the world leaders in the sale of synthetic rubber and also manufactures plastics, chemical materials, aviation accessories, films, flooring, foams and shoe products. All were initiated and developed under Dr. Dinsmore's guidance.

In 1928, Dr. Dinsmore patented the first water-emulsion synthetic rubber in the United States — the synthetic which was used extensively during World War II and later became the backbone of the synthetic rubber industry.

Named assistant to the factory manager in 1932, he was also assigned to the development of new products, and in that period directed the research that resulted in Pliofilm, a major Goodyear product. Four years later he invented the

rayon tire and directed its development. The rayon tire is said to have blazed a path for the later use of nylon and other new fibers throughout the rubber industry. In 1939 he was named development manager.

Dr. Dinsmore served as assistant United States deputy rubber director during World War II, organizing and directing synthetic rubber research and development and coordinating activities of both industrial and university laboratories. In 1943, he was named vice-president of Goodyear.

In recognition of his work in synthetic rubber research, Dr. Dinsmore was awarded the Colwyn Gold Medal for 1947 by Great Britain's Institution of the Rubber Industry, and the Charles Goodyear Medal for 1955 by the Division of Rubber Chemistry of the American Chemical Society. In 1960, he was elected a member of the board of directors of Goodyear.

Many changes took place in rubber technology during Dr. Dinsmore's 47-year career. He considers the three outstanding and signfiicant changes to be: the switch from zinc oxide to carbon black as a reinforcing agent for rubber; the change from cotton to rayon and nylon and other synthetic fibers for tire cords; and the development of synthetic rubbers.

During his long and active career, Dr. Dinsmore has served as president of the ACS Rubber Division, the Akron Section of ACS, the Akron Rubber Group, and the American Institute of Chemists; director of the American Institute of Chemical Engineers and of the American Section of the Society of the Chemical Industry in Great Britain; a Fellow of the Institution of the Rubber Industry in Great Britain, the American Association for the Advancement of Science, and the Royal Society of Arts in Great Britain.

Dr. Dinsmore (left) receives the Charles Goodyear Medal for 1955 from J. M. Ball, then president of the ACS Rubber Division.

Dr. Dinsmore states that despite his retirement he will continue to work on scientific programs. In addition to acting as a consultant to Goodyear, he plans to do some consultation work with other companies on the management side of technology. "Also, I have some interests in the development of new processes and new products in areas other than the rubber industry," he added.

Another major project for which Dr. Dinsmore hopes to have more time is that of locating and aiding gifted children through the National Citizens Council for the Gifted, an organization which he was instrumental in forming.

Vila Predicts Upswing

► At a meeting of the New York Society of Security Analysts, George R. Vila, president of the U. S. Rubber Co., New York, N. Y., predicted that the company's sales and earnings in 1961 would match those of 1960. By 1970, Mr. Vila stated, the company's sales should reach a minimum of $1,600,000,000. Last year, sales were $966,833,000, and net income totaled $30,737,000, equal to $4.45 per share of common stock, after preferred dividends.

Many of the company's research projects are about to pay off in new products, Mr. Vila continued, among them a two-ply tire, Vyrene elastic thread, Expanded Royalite plastic, new types of synthetic rubber, improved plastic resins, and more efficient methods of making rubber hose and conveyor belts. Development of a one-ply tire is not far behind, Mr. Vila concluded.

Plans New Resin Unit

► Texas Butadiene & Chemical Corp., New York, N. Y., is planning a commercial plant to produce its low molecular weight styrene-maleic anhydride (SMA) resins. The company says that it may start construction before the end of 1961. The company has a plant at South Miami, Fla., producing 1 million pounds annually of the SMA resins. It is also building a large pilot plant to produce low molecular weight liquid polymers of butadiene.

Cyanamid Antioxidant

► A low-cost, non-staining, antioxidant that is expected to find use in dry rubber and latex applications has been added to the product line of the Rubber Chemicals Department of American Cyanamid Co., Bound Brook, N. J. Designated Cyanox LF, the new antioxidant is available as an early emulsifiable liquid for foam rubber and rug and upholstery backing latex applications.

Spencer Plans Latex Unit

► Spencer Chemical Co., Chicago, Ill., is erecting a plant at Calumet City, Ill., for the production of polyethylene latex. The new 14,000 square foot facility, estimated to cost more than $1,000,000, will have a capacity of over 20 million pounds of latex annually. The plant is scheduled to go on stream by the early part of 1962.

Cabot Names Three

► Cabot Corp., Boston, Mass., has made three appointments to its technical staff. D. Brittain Briggs, Jr., formerly associated with W. R. Grace & Co., has joined the process design and economic section of the New Products Research Department as a chemical engineer. Leslie H. Spiro, who received his B.A.Sc. degree in chemical engineering from the University of Toronto, has joined the International Division as European technical service representative in special blacks. James J. Brennan, Jr., formerly with Phillips Petroleum Co., has joined the Carbon Black Research Department as a rubber research group leader.

Develops Pliovic S-51

► A low molecular weight resin, called Pliovic S-51, designed for easy mixing and said to have excellent flow properties, has been developed by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. The new resin is a vinyl chloride-vinyl acetate material, produced as a fine, white powder. It is reported to be particularly useful in producing rigid, molded or extruded products under limited processing temperatures. In addition, it produces good film clarity, handles easily on calendering and milling equipment, and can be dissolved in proper solvents to make liquid plastic coatings for many applications.

General and Seiberling Sign URW Contracts

► General Tire & Rubber Co. and the Seiberling Rubber Co. have signed new two-year agreements with the United Rubber Workers union. The agreement between General Tire and URW grants wage increases and master contract benefits to the firm's 3,500 hourly-rated employees at its Akron, Ohio, and Waco, Texas, plants. The Seiberling agreement covers 1,225 employees at its plants in Barberton and Carey, Ohio.

Grants Wage Increase

Under its agreement with the URW, General Tire grants a 7½c an hour increase to its hourly-rated tire plant workers effective June 19, 1961, and an additional 7c an hour increase to be made on June 25, 1962. In the master contract, General Tire granted extension of the supplemental unemployment benefits (SUB); an additional paid holiday; improved vacation grants, with employees with 22 years of service receiving four weeks paid vacation; and other modifications in working agreements. The new agreement is subject to ratification by the membership of the Akron and Waco URW locals, and will expire on May 15, 1963.

The Seiberling agreement provides for wage increases of up to 14½c an hour over the two-year period and an additional paid holiday. Under the terms of the wage settlement, a 7½c hourly increase is granted to employees in Barberton and a 3½c an hour raise to employees of the Shoe Products Division in Carey, both effective on June 19, 1961. On June 25, 1962, the agreement provides a 7c an hour increase for the Barberton employees and a 4c an hour raise for workers in Carey.

Extend SUB Benefits

Supplemental unemployment benefits are extended to cover a maximum of 39 weeks, with maximum payments increased by $5 a week. In addition, employees with five years' seniority who are laid off for more than two years will be permitted to take lump sum separation payment rather than continuing on a laid-off status with seniority rights. Also liberalized was Seiberling's vacation program, which now provides three weeks vacation after 10 years' service and four weeks vacation after 22 years of service.

SUB agreements were signed between the URW and the B. F. Goodrich Co. and the U.S. Rubber Co., identical to those of Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., and General Tire and Seiberling. The agreement means that SUB will not be an issue during the URW contract negotiations with Goodrich, which began on May 8, and with U.S. Rubber, which began May 15.

On another labor front, unfair labor practice charges filed by the United Rubber Workers union against the Perry Rubber Co., Massillon, Ohio, have been upheld by a National Labor Relations Board trial examiner. The examiner, John P. von Rohr, found that by refusing, since August 15, 1960, to bargain with the URW, Perry Rubber has engaged in unfair labor practices as spelled out in the Taft-Hartley Act.

The trial examiner's report calls on Perry Rubber to bargain collectively with URW Local 601 for "wages, rates of pay, hours of employment, and other conditions." Examiner von Rohr described Local 601 as "the exclusive representative of the employees." This, in effect, rules out a rival union, the Perry Rubber Association, which was organized during a strike that lasted from August to November, 1960.

► St. Joseph Lead Co., New York, N. Y., has issued a technical news bulletin entitled "Surface Treated Zinc Oxide for Rubber."

Elephants Prefer Green

► Ringling Brothers and Barnum & Bailey Circus insist that elephants are color-conscious. United States Rubber Co., New York, N. Y., learned this when it received an order from the circus for enough green-colored rubber matting to cover one-half of New York's Madison Square Garden arena. It seems that a few years ago the circus ordered bright yellow mats, and after using them for a while had to spray them with green paint because the animals seemed to like that color better. The rubber mats are being used to replace the sawdust that had decorated arenas for decades. Unlike sawdust, the mats can be rolled up, moved, and used again in the next town.

Butyl Latex Available From Enjay Chemical

► Butyl rubber in latex form is commercially available from the Enjay Chemical Co., New York, N. Y. Designated Enjay Butyl latex 80-21, the new material is said to be a chemically stable emulsion of butyl rubber in water, containing approximately 55 per cent solids. It is reported that the latex can be compounded with pigments, fillers, thickeners, and tackifiers, and is compatible with a wide range of resin and elastomer emulsions. In addition, vulcanizates possessing the environmental resistance and the low permeability to moisture and gases characteristic of butyl rubber can be prepared by curing Enjay Butyl latex 80-21 with sulfur, zinc oxide, and other ultra-accelerators.

According to Enjay, the new material is especially suited for tire cord dipping in the manufacture of butyl tires. Low permeability of butyl films to water vapor, air, and other gases suggest 80-21's use in air-barrier and food-wrapping papers. Other applications in which the new butyl latex is expected to find use include adhesives, textile dips and coatings, emulsion paints, roof coatings, and leather coatings.

Quebec Hears Wright

► A. R. Wright (Northern Electric) gave a talk on "Control of Extrusion" at the final technical meeting of the Quebec Rubber & Plastics Group for the 1960-1961 season, held on April 19 at the Queen's Hotel in Montreal, Quebec, Canada. The speaker discussed the viscosity dependence of the back flow and leakage as well as laboratory methods of measurement. According to Mr. Wright, the pressure-temperature relationships of the compounds are to be considered when operating an extruder under varying conditions. He explained that their effects should be considered from the viewpoint of process control.

O'Sullivan Stock Listed

► Common stock of the O'Sullivan Rubber Corp., Winchester, Va., has been placed for listing on the American Stock Exchange, following final clearance of the company's application by the Securities and Exchange Commission. The company, with 397,761 shares of common stock outstanding, will be listed under the ticker symbol of OSL.

Washington Group Hears Talk by Borg

► E. Leonard Borg, group manager of synthetic rubber and latex research and development for the Naugatuck Chemical Division of the U. S. Rubber Co., gave a talk on "Stereo-Regular Synthetic Rubber" at the Annual Election Meeting of the Washington Rubber Group, held on May 17 at the PEPCO Auditorium in Washington, D. C. The group also elected its officers for the 1961-1962 season.

The new group officers are: *President*, Thomas A. Tharp (General Tire); *Vice-President*, Daniel Pratt (Bureau of Ships); *Secretary*, George T. Wingate (Goodyear); and *Treasurer*, George A. Smith (National Security Agency).

Stereo Rubbers Important

In his address, Mr. Borg stated that since 1955 the stereo-specific rubbers have become important members of the family of synthetic rubbers. He informed the group that *cis*-1,4 polyisoprene is essentially a duplicate of natural rubber and represents the culmination of a search for the man-made duplicate of natural rubber. The speaker pointed out that *cis*-1,4 polybutadiene has already achieved considerable commercial success.

Mr. Borg remarked that the amorphous copolymer of ethylene and propylene, while not stereo-specific, is a further example of the broad field which has been opened by the discovery of the new catalysts. According to the speaker it is also likely to find a place in the growing family of synthetic rubbers.

The speaker illustrated his talk with slides and discussed the typical properties and characteristics of stereo-specific rubbers, as well as indicated uses.

E. L. Borg

The newly-elected 1961-1962 officers of the Washington Rubber Group. Left to right: *Secretary*, George T. Wingate (Goodyear); *President*, Thomas A. Tharp (General Tire); *Vice-President*, Daniel Pratt (Bureau of Ships); *Treasurer*, George A. Smith (National Security Agency).

New Bakelite Copolymer

► A new ethylene copolymer, reported to have excellent flexibility over a broad temperature range and high resistance to stress-cracking, has been developed by the Union Carbide Plastics Co., New York, N. Y. Called Bakelite DPDB-6169, the new compound, at room temperature, has the torsional stiffness of a 90A Durometer elastomeric vinyl. Compared at —25°C., however, it is reported to be nine times as flexible. Compared with a conventional low-density polyethylene, it is said to be four times as flexible at room temperature, and three times as flexible at —25°C.

The company states that with the flex-cracking resistance of rubber, the resiliency and elongation properties of low-density polyethylene and the stress-cracking resistance of vinyl, the copolymer can be regarded as a completely new material, rather than a modified polyethylene. Suggested applications include such items as industrial bellows, diaphragm pumps, moldings, gaskets, and thin-walled and inflatable toys.

Humble Markets Oils

► Humble Oil & Refining Co., New York, N. Y., is now marketing process oils for the rubber industry. There are 21 grades in the new Flexon line of oils, and Humble recommends 7 of these for their non-staining properties, an important consideration in whitewall tires, houseware products, toys, and other light-colored rubber items.

Second Albert Indictment

► Sidney L. Albert, already under indictment for manipulating common stock of Bellanca Corp., Akron, Ohio, which he formerly headed, has just been accused in a second Federal indictment, in connection with alleged illegal stock operations. Mr. Albert and four other men were named in a Federal indictment in New York with conspiring to sell 200,000 unregistered shares of stock of Automatic Washer Co., a now bankrupt Iowa firm. The indictment says that the stock was sold at from $3 to $9 a share through the Midwest Stock Exchange in Chicago. The conspiracy charge carries a maximum penalty on conviction of five years in prison and a $10,000 fine. No date was set for a hearing.

Mr. Albert also is involved in a number of civil suits growing out of transactions which enabled him to acquire control of Bellanca in 1955, then known as Bellanca Aircraft Corp. Among these is a $26 million dollar damage suit filed by Bellanca's present management.

DuPont Building New Unit

► A new facility for the production of methylamines and their derivatives is being constructed at Belle, W. Va., by E. I. du Pont de Nemours & Co., Inc. The Belle plant will produce dimethylacetamide (DMAC), dimethylamine (DMA), dimethylformamide (DMF), and monomethylamine (MMA). The new unit will more than double Du Pont's production capacity for methylamines, previously made only at the company's Houston, Texas, plant.

CMRA Hears Rhoad On Future of Rubber

► M. J. Rhoad, manager of the Rubber & Rubber Chemicals Department of the Goodyear Tire & Rubber Co., predicted that the United States should have in place 120,000 long tons of polyisoprene capacity and 250,000 long tons of polybutadiene capacity by 1965. Mr. Rhoad made the prediction in a talk he gave at the 21st Annual Meeting of the Chemical Market Research Association, held on May 17 and 18 in New York City.

According to Mr. Rhoad, rubber demand throughout the world should reach 5,400,000 long tons by 1965, which represents a sharp gain over 1960 when an estimated 4,300,000 long tons were consumed. He stated that projected stereo-specific rubber capacity outside the United States is 500,000 long tons, of which four-fifths will be in Iron Curtain countries. The speaker remarked that the large figures reported for the Soviet Union and its satellites are not to be discounted. According to Mr. Rhoad, the 400,000 tons planned are largely polyisoprene and, viewed realistically, this makes a lot of sense.

Discusses Soviet SBR

The Goodyear manager informed the chemical market researchers that we have known that at least some of the Russian SBR has been of inferior quality. To keep their tire factories turning out acceptable products, the Soviets have had to purchase substantial quantities of natural rubber. He pointed out that since the Russians are tied to equipment and know-how based on natural rubber, a synthetic-natural rubber such as *cis*-polyisoprene means more to them than to the United States' rubber industry, which has successfully converted the bulk of its usage to SBR and the older synthetic rubbers. He stated that owing to the development of stereo-specific rubbers, it appears that both natural rubber and its replacements must be capable of being produced and sold profitably at prices below 20 cents in the future.

According to Mr. Rhoad, the rubber industry can look forward to the following developments in four general areas:

A continued growth can be expected for synthetic rubber, since rising world demand cannot possibly be met by natural rubber.

Foreign competitors are determined to close the gap on the United States, which has held undisputed leadership in synthetic rubbers for 20 years.

The new stereo-specific rubbers will force natural rubber into a battle of economics that will command a closer scrutiny of rubber raw materials and process costs, both in the United States and abroad.

The United States synthetic rubber industry faces two challenges — in technology and marketing. It must, along with its petroleum and chemical partners, sharpen technological skills and revive its marketing abilities.

F. O. Holmes

Named by United Carbon

► Frank O. Holmes, previously manager of laboratory technical service for the United Carbon Co., Inc., has been promoted to manager of technical service at the company's service laboratory in Akron, Ohio. His duties now include management of both laboratory and field technical service. Mr. Holmes was associated with Goodyear Tire & Rubber Co for 17 years, both in this country and in Sweden in various technical capacities, before joining Armstrong Tire & Rubber Co. as technical director in 1952. He left the company in 1955 to become factory manager for W. J. Voit Rubber Corp., and in 1958 he joined United Carbon. Mr Holmes was responsible for the design and construction of the Akron service laboratory during 1959 and 1960.

► Kenrich Petrochemicals, Inc. has moved its executive offices to 26 Broadway, New York 4, N. Y.

Buffalo and Ontario Hold Joint Meeting

► The 19th Annual International Meeting between the Buffalo Rubber Group and the Ontario Rubber Group was held on May 12 at the Hotel Sheraton Brock in Niagara Falls, Ontario, Canada. Dr. Willard D. Cheek, senior research physicist at the research laboratories of General Motors Corp., was the guest speaker at the joint meeting, and his talk was entitled "The Ropes of the Past Ring the Bells of the Future."

In his talk, Dr. Cheek emphasized the necessity of research and development people working together in close contact to reduce the time lag between discovery and application. He used demonstrations of light-sensitive materials, territes, and semiconductors to stress his points. Dr. Cheek also pointed out that while total rubber consumption is increasing in the United States, tire rubber consumption is leveling off. The speaker was of the opinion that this should be a significant sign to the tire companies to broaden their fields.

Hear Annual Short Talks

► The Elastomer and Plastics Group, Northeastern Section, American Chemical Society, held its Annual Short Talks Meeting on May 16 at the Morse Auditorium in Boston, Mass. Dr. Chester Mijal (U B S Chemical) served as meeting chairman. The subjects of the talks and the speakers were: "Infra-Red Spectroscopy of Emulsion Copolymer" by Leonard Shapiro (Beacon Chemical Industries); "Lecture Series on Polymerization Designed for Plant Personnel" by Henry Merken (Polyvinyl Chemicals); "Water Soluble Polymers for Surface Coatings" by Norwin Wolff (U B S Chemical); and "Mechanism of Film Formation from Latex" by William F. Scheufele (Dewey and Almy).

Scott Testers Expands

►Scott Testers (Southern) Inc., Spartanburg, S.C., has completed an enlargement of its facilities which doubles the operating capacity of its five-year-old building. The company states that the expanded facilities are designed to provide more adequate working area for the overhaul and repair of Scott Testers equipment. The plant will continue to serve as sales and service headquarters for the southeastern territory.

Winkelmann Addresses Chicago Rubber Group

► The Chicago Rubber Group honored Dr. Herbert A. Winkelmann, the Charles A. Goodyear Medalist of 1961, at its Graduation Night Meeting, held on April 28 at the Furniture Club in Chicago, Ill. Dr. Winkelmann, vice-president of the Dryden Rubber Division of Sheller Mfg. Corp., repeated his Goodyear Medal Lecture on "Coatings for Rubber" which dealt with one of his most recent developments for coating dense and sponge rubber for automobile weatherstrips and other applications requiring low friction combined with oil resistance. A comprehensive report of Dr. Winkelmann's Goodyear Lecture appeared in the May, 1961, issue of RUBBER AGE.

The newly-elected 1961-1962 officers and directors of the Chicago Rubber Group were announced during the meeting. They are: *President*, Ted C. Argue (Roth Rubber); *Vice-President*, Robert Kann (Goodyear); *Secretary*, Harold Stark (Dryden Rubber); *Treasurer*, Stanley Shaw (Witco Chemical); *Directors*, Fred Klepetar (Johns-Manville); Cornelius Woods (Dryden Rubber); Joseph Stonis (C. P. Hall); and Charles Wimmer (Phillips Chemical).

Another highlight of the meeting was the presentation of certificates to 37 members of the Chicago Rubber Group who completed a group-sponsored course on rubber technology.

Jurgeleit Presents Paper

On March 10, the Chicago Rubber Group held a meeting at which Dr. H. F. Jurgeleit, head of methods research and process development of the Central Engineering Division of the U. S. Rubber Co., presented a paper on "The Development of Injection Molding and the Flashless Molding Process for Rubber and Rubberlike Materials." An abstract of Dr. Jurgeleit's remarks appeared in the May, 1961, issue of RUBBER AGE. His complete paper will be published in a forthcoming issue of RUBBER AGE.

A panel discussion followed Dr. Jurgeleit's talk. Albert Breckel (Victor Gasket) served as moderator, and the panelists included Bert Vandermar (Acadia Synthetic Products); Edward Meisner (Chicago Rawhide); S. H. Holmes (Holmes Co.); and H. A. Sannes (Chicago Rawhide).

The 1961-1962 officers of the Chicago Rubber Group. Left to right: *Secretary*, Harold Stark (Dryden Rubber); *Vice-President*, Robert Kann (Goodyear); *President*, Ted C. Argue (Roth Rubber); and *Treasurer*, Stanley Shaw (Witco Chemical).

Hart Sees Upswing

► Speaking at a meeting of the Boston Security Analysts Society, John N. Hart, vice-president and controller of the B. F. Goodrich Co., Akron, Ohio, announced that capital expenditures for Goodrich in 1961 would exceed $50 million, the largest in the company's history. Its investment in new capital in 1959 and 1960 exceeded $75 million, Mr. Hart stated. Goodrich is now completing modern tire plants in Iran, another tire plant in Canada to replace and expand outdated facilities there, and a modern plant near Fort Wayne, Indiana. The company is also planning to continue its emphasis on research, and will expand its research center at Brecksville, Ohio.

Mr. Hart went on to say that although estimates for first quarter business indicate a low point in earnings for the rubber industry, Goodrich anticipates "substantial improvement in earnings during the remainder of the year, with the last half, especially the last quarter, well above last year."

RUBBER RED BOOK

► Any changes in your products or personnel since you completed and returned your questionnaires for the 1962 RUBBER RED BOOK? Please keep us advised so that your listings will be up-to-date. Address the editor, RUBBER RED BOOK, 101 West 31st St., New York 1, N. Y.

Addresses ACS Meeting

► Dr. Edward M. Bevilacqua, senior research scientist at the research center of the United States Rubber Co. in Wayne, N. J., addressed a meeting of the polymer group of the American Chemical Society's North Jersey Section, held on May 23 at Seton Hall University in South Orange, N. J. Currently trying to learn what makes natural rubber crack and fail from oxidation after several years, Dr. Bevilacqua told the group that natural rubber exposed to oxygen reacts to form volatile materials. These are produced in a complicated series of individual steps. The complex reaction sequence was worked out during the past few years by bringing together the results of widely different experiments, Dr. Bevilacqua explained. Some dealt with the way acetic acid, essential ingredient of vinegar, is formed. Some concerned the effects of oxygen on the preparation of polystyrene, a popular plastic. Others came from study of the burning of airplane fuels. The gaps were filled with research on rubber itself. Dr. Bevilacqua stated that while the main features of the reaction are known, more work is needed.

Woloch Merges

► A merger agreement has been made between the George Woloch Co., Inc., New York, N. Y., and Interplastics Corp., Long Island City, N. Y., under which Interplastics becomes a part of the Woloch organization.

Rubber Industry Construction and Expansion

The editors of RUBBER AGE feel that the continuing growth and expansion of the rubber industry is of interest and importance to those associated with the industry. Each issue of RUBBER AGE contains news items on expansion activities of both rubber manufacturers and suppliers. Periodically, we will summarize the growth of the rubber industry in terms of new plant construction and additions to existing facilities. The following companies have announced expansion plans as of January 1, 1961:

RUBBER GOODS MANUFACTURERS • • •

Company	Location	Products	Remarks
Armstrong Rubber Co.	Hanford, Calif.	Tires	Cost: $25,000,000. Capacity: 10,000 tires a day.
CPR International Corp.	Torrance, Calif.	Polyurethane foam	Size: 30,000 square foot building, now in operation. Flexible, rigid and solid types. Also producing urethane polyester base.
Ecuadorian Rubber Co.	Cuenca, Ecuador	Tires	Capacity: 40,000 tires per year. General Tire & Rubber Co. is principal stockholder.
Gates Rubber Co.	Erembodegem, Belgium	Belts and hose	Cost: $4,000,000. Completion expected by late 1961.
B. F. Goodrich Iran, S.A.	Teheran, Iran	Tires, Tubes, Tread Rubber	Cost: $7,000,000. Size: 130,000 square feet. Includes group of Iranian investors.
Goodyear Tire & Rubber Co.	Akron, Ohio	Research facilities	Spending $1,500,000 on expansion which will increase present laboratory by 30%.
Lauman Golf Supply, Ltd.	Kitchener, Ont., Canada	Golf Balls, Mechanical Goods	Operation expanded to include molding of small industrial rubber goods.
Madras Rubber Factory, Ltd.	Madras, India	Tires, Tubes, Tread Rubber	Capacity: 300,000 tires, 300,000 tubes and 1,000,000 lbs. of tread rubber per year. Associate Company: Mansfield Tire & Rubber Co.
Mansfield Rubber (Canada), Ltd.	Barrie, Ont., Canada	Tires	30,000 square foot expansion of plant. Second extension of facilities in five years.
Ohio Rubber Co.	Fort Smith, Arkansas	Molded Goods	Cost: $3,500,000. Company's fifth manufacturing facility.
Parke, Davis & Co.	Greenwood, S. C.	Surgical dressings	Cost: $4,000,000. Completion expected late 1961.
Pittsburgh Corning Corp.	Port Allegany, Penna.	Polyurethane foam	Now in production.

SUPPLIERS • • •

Cabot Corporation	Campana, Argentina	Carbon black	Cost: $4,000,000. Capacity: 30,000,000 lbs. per year. Operation expected by late 1961.
General Electric Co.	Waterford, N. Y.	Intermediate silicone chemicals	Ninth manufacturing unit for Silicone Products Department. Operation by mid-1961.
Goodrich-Gulf Chemicals, Inc.	Institute, West Virginia	Ameripol CB *cis*-polyisoprene	Capacity: 20,000,000 lbs. per year. Production anticipated by end of 1961.
Petroquimica Argentina S.A. (U. S. Rubber, Witco Chemical, Continental Oil, Cities Service, Fish International)	San Lorenzo, Argentina	Petrochemicals	Includes facilities for 45,000 tons of synthetic rubber per year. Both SBR and *cis*-polyisoprene types are planned.
Polymer Corporation (SAF)	La Wantzenau, France	Specialty synthetic rubbers	Cost: $12,000,000. Capacity: 10,000 tons per year.

Spencer Chemical Co.	Calumet City, Ill.	Polyethylene latex	Cost: Over $1,000,000. Capacity: 20,000,000 lbs. per year. Completion by early 1962.
Sto-Chem, Ltd. (U. S. Rubber, Witco Chemical)	Midlands of England	Synthetic rubber latex	Cost: $2,500,000. Capacity: 8,000,000 lbs. per year. Butadiene-styrene, high styrene, nitrile and acrylic types. Completion scheduled by Fall of this year.
United Carbon Co.	Mojave, Kern County, Calif.	Carbon black	Capacity: 64,000,000 lbs. per year. Scheduled to go on stream by end of 1961.
United Carbon Co.	Valencia, Venezuela	Carbon black	Cost: $3,000,000. Capacity: 20,000,000 lbs. a year. Plant will be operated by United Carbon de Venezuela, C.A.
U. S. Rubber Reclaiming Co.	Liverpool, England	Reclaimed rubber	Cost: $2,100,000. To be operated in conjunction with Dunlop Rubber Co. Completion expected by mid-1962.
U. S. Rubber Reclaiming Co.	Vicksburg, Miss.	Reclaimed rubber	Cost: $1,250,000.

G-E Silicone Compounds

► Two new silicone rubber compounds are being marketed by the Silicone Products Department of the General Electric Co., Waterford, N. Y. A non-milling silicone rubber compound, called SE-9008, said to retain its freshened life for more than three months, is suggested for use as extruded insulation on power cable, fixture wire and other commercial and military wire and cable applications. Typical properties as extruded on wire are as follows: tensile strength, 800 psi; elongation, 550 per cent; volume resistivity, 2.5 x 10^{15} ohm-cm; electric strength, 700 volts per mil; power factor, .006 60 cps. An extreme low-temperature compound, called SE-5401U, is designed for use in molded and extruded seals and gaskets and other mechanical applications. The compound has the following typical properties after 24 hours at 480°F.: hardness, 40 Shore A; tensile strength, 900 psi; elongation, 400 per cent; tear strength, 65 Die B, pi.

Naugatuck Unit Opens

► Naugatuck Chemical, Naugatuck, Conn., has transferred its Marvinol vinyl resin and vinyl plastic compounding operation from its main plant to newly-erected facilities at its vinyl resin plant in Painesville, Ohio. The new 7,400 square foot unit, which has just gone into production, is capable of producing millions of pounds of vinyl compounds yearly. The company states that the move was made to permit the division to produce a broader range of vinyl compounds of both the flexible and rigid types.

Offers Dry Mold Release

► A dry mold release and lubricant that can be sprayed on parts and materials as an easily-identified color coating has been developed for the rubber, plastic and metal fabricating and electronics fields by the Miller-Stephenson Chemical Co., Inc., South Norwalk, Conn. Marketed as S-122-C mold release-lubricant, the agent is based on a recently perfected fluorocarbon dispersion that performs effectively under conditions of high temperature, reportedly to 500°F. The color-base material, now available in developmental quantities, permits users to distinguish between coated and non-coated areas. Suggested uses are as a mold release for electronic potting and encapsulating, injection and compression molding of phenolic and epoxy resins, and silicone rubber, and as a general mold release and lubricant for plastics and metal products.

Manhattan Elects Officers

► Manhattan Rubber Manufacturing Co., Neenah, Wisc., a subsidiary of Raybestos-Manhattan, Inc., Stratford, Conn., has made four new executive appointments. J. N. Kuzmick, vice-president and director of Raybestos - Manhattan, has been elected a vice-president and director of the subsidiary. R. B. Hazard, vice-president and director of Raybestos-Manhattan, has been appointed a director of Manhattan Rubber. A. A. Campbell, formerly resident manager of Manhattan Rubber, has been made a vice-president. A. F. Kuehn, Jr., has been named resident manager.

Amoco Names Three

► James R. Eiszner, R. Wayne Yelverton and Robert D. Sieron have been appointed to newly - created posts in the Marketing Department of Amoco Chemicals Corp., Chicago, Ill. Mr. Eiszner, formerly supervisor of market research and development of organic chemicals, has been named director of market development for chemicals. Mr. Yelverton, who has had various assignments in commercial and technical development at Amoco, becomes director of market development for polymers. Mr. Sieron, who has worked in the area of business evaluations, has been appointed director of market development for hydrocarbons.

Stockpile Reduced

► The General Services Administration has reported the sale of 3,719 long tons of natural rubber from the National stockpile during March, bringing to 102,895 long tons the total sold from the stockpile since the disposal program began in 1959. This was the first GSA sale announcement in several months, since the rubber market fell below 30 cents a pound from the beginning of the year into mid-March.

Huber Buys Clay Firm

► J. M. Huber Corp., New York, N. Y., has acquired the assets of the International Clay Co., Graniteville, S. C. The purchase was made in order to add to Huber's resources of kaolin clay. The mine and properties of International Clay adjoin Huber's largest mine in South Carolina.

Philadelphia Holds Panel on Vulcanization

► The Philadelphia Rubber Group technical meeting held on April 28 at the Poor Richard Club in Philadelphia, Penna., featured a panel discussion on "Non-sulfur Vulcanizing Systems." Moderator for the discussion was Dr. B. S. Garvey, Jr., director of the Rubber Service Laboratory for Pennsalt Chemicals Corp., Philadelphia, Penna., who delivered an introduction to the discussion. The panel members and their papers were: Lyle O. Amberg (Hercules Powder), "Peroxide Vulcanization"; W. H. Deis (Merck & Co.), "Magnesium Oxide Cure Systems"; William H. Crom (Merck), who presented the paper authored by Mr. Deis; Dr. Paul Viohl (U. S. Rubber), "Resin Vulcanization," and R. Thomas Zimmerman (R. T. Vanderbilt), "Vulcanization by Use of Sulfur Donor Materials."

Describes Process

In his introduction, Dr. Garvey described vulcanization as the process by which unvulcanized rubbers, or thermoplastic materials, are changed into the final product, which is elastic, tough, and strong, and is insoluble in those solvents which dissolve the unvulcanized rubber. The change is brought about by mixing the rubber with a vulcanizing system consisting of one or more chemicals, and heating under pressure.

Mr. Amberg explained that peroxide vulcanization results exclusively in carbon-to-carbon bonds between polymer chains. The free radicals from the peroxides extract hydrogen atoms from the more reactive sites on the polymers, leaving free radicals on the polymer chains. These free radicals then react with similar radicals in other polymer chains to give cross-links. This mechanism probably accounts for the increased oxidation stability of peroxide-cured rubber, since sulfur cross-links are reported to be more sensitive to oxygen than are carbon-to-carbon bonds, even in age-resistant rubbers resulting from vulcanization with Thiuram accelerators.

The speaker classified peroxides into two broad groups: those whose decomposition into radicals can be accelerated or retarded by other chemicals, and those which are responsive only to changes in temperature.

Mr. Crom stated that there are two general types of magnesium oxide available to the rubber compounder. They differ in purity, surface activity, and reactivity toward acid. First, the heavy calcined designation refers to an inactive, and generally impure, type of magnesium oxide which was one of the first inorganic accelerators for natural rubber. It finds limited use in today's compounding. The second type is the magnesium oxide of controlled activity which is a necessary and important compounding ingredient for many elastomers. The largest use of this type is in polymers that contain halogen.

Tells of New Use

Mr. Crom described a new use for magnesium oxide—use in conjunction with peroxide cures. To date, work by the suppliers of peroxides shows that magnesium oxide raises the pH or gives a more basic system, which results in more efficient utilization of free radicals and, hence, improved physical properties, evident with acidic and some basic fillers. It also results in white natural rubber compounds with superior aging and weathering properties.

Dr. Viohl discussed the fundamental principles of vulcanizing butyl rubber with 2,6-dimethylol-4-hydrocarbylphenol condensation polymers. The speaker preferred to explain vulcanization on the basis of chromane ring formation rather than on a structure arrived at by the removal of an active hydrogen atom from an isoprene unit in the butyl chain. Dr. Viohl stated that "catalysts" play a dual role in the vulcanization reaction, since they not only increase the rate of vulcanization, but also increase the ultimate state of vulcanization.

The best catalysts for the curing of butyl rubber with resins are metallic halides such as tin chloride, zinc chloride and ferric chloride. Metallic halides of this type are strongly acidic and tenderize textile materials. This fact led U. S. Rubber to develop 2,2′-methylene-bis-(4-chloro-6-methylolphenol), a chemical that vulcanizes butyl rubber at a more practical rate, without requiring acidic catalysts.

Other interesting resins that have appeared in the last year or so, the speaker summarized, are Schenectady resin SP-1055, a 2,6-dimethylol-4-hydrocarbylphenol resin modified with small amounts of hydrogen bromide, and Union Carbide Plastics' CRRA-0803 resin, described as "a new heat-advancing alkyl phenol resin designed as a curing agent for butyl rubber."

The last speaker, Mr. Zimmerman, covered the early history and early sulfur donor materials used, as well as the currently available sulfur donors. By far the most important discovery concerning sulfur donor materials, Mr. Zimmerman stated, was that of the alkyl thiuram disulfides. Tetramethyl thiuram disulfide, up to this time, has been the most widely used sulfur donor vulcanizing agent in the industry. The use of tetramethyl thiuram disulfide produces fast cures, and resultant vulcanizates are profoundly more resistant to heat deterioration than are vulcanizates produced by added elemental sulfur.

Cites Two Theories

In one theory, the thiuram disulfide materials are believed to break down to form monosulfides and trisulfides. The trisulfides are suggested sources of sulfur radicals which react with the methylenic hydrogen atoms of the chain and then copolymerize to form carbon to sulfur to sulfur to carbon (C-S-S-C) cross-links between the chains. Since zinc oxide and a fatty acid (as stearic or lauric) are necessary for the best functioning of the thiuram disulfides, a second theory is postulated.

Upon the application of heat to the rubber mass containing the above ingredients, the speaker explained, the zinc is solubilized by reaction with the fatty acid and, in turn, reacts with the thiuram disulfide to form zinc dithiocarbamate and an active atom of sulfur. The sulfur atom is extremely reactive and, with the zinc dithiocarbamate acting as a catalyst, enters into reaction with the terminal couple bonds to produce cross-linking with C-S-C or C-S-S-C bonds between chains.

Keep Us Posted

► Rubber Manufacturers and suppliers to the rubber industry are advised to keep us posted of any personnel and product changes which may have occurred since RUBBER RED BOOK questionnaires were completed and returned to us. In this way, listings in the 1962 edition will be complete and up-to-date. Address the editor, RUBBER RED BOOK, 101 West 31st St., New York 1, N. Y.

Lamb Gains One Seat On Seiberling Board

► Shareholders of the Seiberling Rubber Co., Akron, Ohio, have elected ten of the eleven directors nominated by management at the annual stockholders meeting, and five insurgents to the 15-man board. The election represents a gain of one seat on the board of directors by a group headed by Edward O. Lamb, largest stockholder in the company.

A running battle between management, headed by J. P. Seiberling, chairman and president of the company, and Mr. Lamb's group began in 1956, when Mr. Lamb conducted a proxy fight for control of Seiberling, eighth largest rubber manufacturer in the country. At that time, he won four seats on the board, which have been maintained in the interim. In the current election, Seiberling's management held proxies for 360,998 shares, and the Lamb group held 207,556 shares of a total of 587,626 common shares entitled to vote. Shares represented in the meeting amounted to 96.7 per cent of those outstanding.

Cumulative Voting

Under the company's cumulative voting rules, stockholders multiply their shares by the number of directors posts up for a vote, and concentrate or distribute these votes as they wish. This enabled Mr. Lamb's group to elect its fifth member of the board. The ten directors elected by the management were: J. P. Seiberling, chairman and president; H. P. Schrank, executive vice-president; L. M. Seiberling, vice-president of sales; T. T. Sweeny, vice-president of Snow, Sweeny & Co., Inc., New York, N. Y.; W. P. Seiberling, retired; H. E. Edward Paige, president of the First National Bank, Akron, Ohio; L. M. Buckingham, general counsel; P. A. Frank, president of the National Rubber Machinery Co., Akron; E. T. Herndon, partner in Eastman, Dillon, Union Securities & Co., New York City; and Harold L. Fox, an accountant, who succeeds R. J. Thomas, vice-president and treasurer.

The Lamb group elected J. Howard McGrath, former U. S. Attorney General, J. Eugene Farber, Toledo, Ohio attorney, Ralph A. Lucke, president of the United Savings and Loan Association of Toledo, Everett A. Sisson, executive vice-president of Lamb Industries, Inc., and Mr. Lamb.

G. E. Thompson

Named by Goodrich-Gulf

► George E. Thompson has been appointed director of SBR process development for Goodrich - Gulf Chemicals, Inc., Cleveland, Ohio. Mr. Thompson received his B.S. degree in chemical engineering from Purdue University, and his M.S. degree in chemistry from the University of Akron. He joined B. F. Goodrich Chemical Co. in 1949, and has been engaged in the development of synthetic rubber since that date. He was on loan during 1953-1954, to the RFC, Office of Rubber Reserve.

Brunswick Names Three

► Brunswick Corp. has announced the appointment of three members of its staff to managerial posts at its new golf ball plant in Covington, Ky. Carl W. Lundgren, formerly manager of the Golf Ball and Rubber Department in Cincinnati, Ohio, has been appointed production manager; Edwin D. Ricker, formerly employee relations supervisor in Cincinnati, has been named administrative services manager; and T. W. Culbertson, formerly an industrial engineer, has been appointed plant manufacturing engineer at the Covington plant.

G-E Silicone Fluids

► The Silicone Products Department of General Electric Co., Waterford, N.Y., has developed a new class of nitrile-containing silicone fluids. The company reports that the presence of nitrile groups in the fluids gives them high polarity, and results in such properties as solvent resistance, limited electrical conductivity, and high dielectric constant.

AIChE Hears Papers On Synthetic Rubber

► Papers on synthetic processes for isoprene and new chemical engineering equipment for synthetic rubber manufacture were presented at the joint meeting of the American Institute of Chemical Engineers and the Chemical Engineering Institute of Canada, held on May 7 to 10 at the Sheraton-Cleveland Hotel in Cleveland, Ohio. The three-day meeting consisted of 25 sessions at which 99 papers were given.

Papers presented at the symposium on Synthetic Processes for Isoprene were:

"Screening Isoprene Processes" by K. J. Frech and V. J. Anhorn (Goodyear).

"Isoprene Production by the Houdry Process" by A. A. DiGiacomo, J. B. Maerker and J. W. Schall (Houdry Process).

"A Process for Making Isoprene from Propylene" by V. J. Anhorn and K. J. Frech (Goodyear).

"Isoprene from C_4 Cuts" by A. L. Giraud (Institute Francais du Petrole).

"Purification of Isoprene by Fractional Distillation" by R. E. Lynn and J. C. Healy (Goodrich-Gulf).

Papers presented at the session on New Chemical Engineering Equipment for Synthetic Rubber Manuture include:

"Thin Film Synthetic Rubber Polymerization Combined with Fluid Compounding" by J. F. Lynch and J. E. Germack (Marco Development).

"Heat Transfer Equipment and Fluid Flow Characteristics Encountered During Pilot Plant Preparation of Stereo-Specific Rubbers" by F. L. Kuchinski and F. T. Muraski (Goodyear).

"Disolventizing the New Synthetic Rubbers" by C. Beal and L. Basel (Crawford & Russell).

"Planning Computer Control of Continuous Polymerization in the Largest Synthetic Rubber Plant" by K. G. Rocquemore and E. E. Eddey (Goodyear).

"Mechanical Dewatering and Drying of Natural and Synthetic Rubbers" by J. W. Dunning and Sheldon Baer (V. D. Anderson).

► Firestone Synthetic Fibers Co. will produce a lofted nylon filament for rugs and carpeting at Hopewell, Va., under the trade name Nyloft, which it acquired from the Industrial Rayon Corp.

Rubber Manufacturing Industry Plant Vacation Schedules

As a service to the rubber industry and its suppliers, there appears below a listing of those companies which have announced vacation schedules during which time the plants will close. It may be said, however, that many of the companies involved will maintain standby staffs during the period. The dates appearing after each company name may or may not be inclusive and appear as reported by the individual concerns. Where more than one plant is involved, the listing will so state. The listings are, of course, published for guidance only.

United States

A

AA Patch Co., Holyoke, Mass. (July 3-July 17)
Accurate Manufacturing Co., Garfield, N. J. (June 30-July 17)
Accurate Products Co., San Diego, Calif. (June 23-July 10)
Acme-Hamilton Mfg. Corp., Trenton, N. J. (July 9-July 16)
Ajax Comb Co., Morrisville, Penna. (July 22-Aug. 7)
Aldan Rubber Co., Philadelphia, Penna. (July 24-Aug. 7)
Allpax Co., Mamaroneck, N. Y. (July 10-July 24)
American Biltrite Rubber Co., Trenton, N. J. (June 30-July 10)
American Hard Rubber Co., Butler, N. J. (June 30-July 16); Akron, Ohio (June 30-July 16)
American Rubber Corp., Albertville, Ala. (July 1-July 16)
American Rubber & Plastics Corp., LaPorte, Ind. (June 30-July 10)
Ames Rubber Corp., Franklin, N. J. (July 14-July 31)
Anaconda Wire & Cable Co., New York, N. Y. (July 17-July 31); Orange, Calif. (July 17-July 31; Marion, Ind. (July 10-July 24); Watkinsville, Ga. (July 17-July 31)
Anchor Hose & Rubber Corp., Mt. Vernon, N. Y. (July 1-July 9)
Anchor Industries, Inc., Cleveland, Ohio (July 1-July 17)
Apex Molded Products Co., Philadelphia, Penna. (July 17-July 31)
Armour Alliance Industries, Coated Abrasives Div., Alliance, Ohio (July 3-July 17)
Armstrong Cork Co., Closure Plant, Lancaster, Penna. (July 17-July 30)
Armstrong Rubber Co., Norwalk Div., Norwalk, Conn. (Aug. 20-Sept. 5)
Armstrong Rubber Mfg. Co., Des Moines, Iowa (Aug. 21-Sept. 5)
Associates Rubber, Inc., Quakertown, Penna. (July 24-Aug. 4)
Avon Sole Co., Avon, Mass. (July 1-July 17)

B

Barco Mfg. Co., Barrington, Ill. (July 17-July 31)
Bardon Rubber Products Co., Union Grove, Wisc. (June 30-July 10)
Barry Wright Corp., Watertown, Mass. (July 1-July 18)
Baxter Laboratories, Inc., Morton Grove, Ill. (July 28-Aug. 7)
Bearfoot Sole Co., Wadsworth, Ohio (July 1-July 9)
Beebe Rubber Co., Nashua, N. H. (July 3-July 17)
Bonafide Mills, Inc., Trenton, N. J. (July 3-July 10)
Bond International, Inc., Detroit, Mich. (July 21-Aug. 6)
Borden Chemical Co., Adhesives & Chemicals Dept., Peabody, Mass. (July 3-July 17); Middlesex, N. J. (July 3-July 10)
Boston Woven Hose & Rubber Div., American Biltrite Rubber Co., Boston, Mass. (July 3-July 17)
Bristol Mfg. Corp., Bristol, R. I. (Aug. 5-Aug. 20)
Arthur S. Brown Mfg. Co., Tilton, N. H. (June 30-July 17)
Brunswick Rubber Co., New Brunswick, N. J. (June 30-July 17)
Buffalo Weaving & Belting Co., Buffalo, N. Y. (July 15-July 30)

C

Cambridge Rubber Co., Taneytown, Md. (July 1-July 17)
Carolina Rubber Hose Co., Salisbury, N. C. (July 3-July 8)
Carr Mfg. Corp., Bristol, R. I. (July 1-July 17)
Cello Co., New York, N. Y. (June 30-July 18)
Cementex Co., New York, N. Y. (July 4-July 11)
Central Rubber Co., Belvidere, Ill. (June 30-July 17)
Chardon Rubber Co., Chardon, Ohio (July 1-July 10)
Chemical Products, Inc., Detroit, Mich. (July 1-July 31)
Chemical Rubber Products, Inc., Beacon, N. Y. (July 1-July 16)
Chicago-Allis Mfg. Corp., Chicago, Ill. (June 30-July 18)
C. F. Church Div., American-Standard, Monson, Mass. (July 17-July 28); Holyoke, Mass. (July 3-July 14); Brattleboro, Vt. (July 3-July 14)
Circle Wire & Cable Corp., Maspeth, N. Y. July 1-July 16)
Clarksdale Rubber Co., Clarksdale, Miss. (June 2-June 12; Aug. 28-Sept. 5)
Clevite Harris Products, Inc., Milan, Ohio (July 15-July 31)
Coated Products, Inc., Middlesex, N. J. (July 3-July 17)
Coaters, Inc., New Bedford, Mass. (July 1-July 10)
Collette Mfg. Co., Amsterdam, N. Y. (July 1-July 10)
Collins & Aikman, Cavel, N. C. (June 30-July 10)
Collyer Insulated Wire Co., Pawtucket, R. I. (July 3-July 16)
Colonial Rubber Co., Ravenna, Ohio (July 1-July 17)
Columbus Glove Mfg. Co., Columbus, Ohio (July 1-July 17)
Comar Products, Inc., Butler, N. J. (July 8-July 24)
Congoleum-Nairn, Inc., Trenton, N. J (July 3-July 17)
Conneaut Rubber & Plastics Co, Conneaut, Ohio (June 30-July 18)
Consolidated Rubber Mfg. Co., Bloomfield, N. J. (July 17-July 30)
Continental Rubber Works, Erie, Penna. (July 2-July 17)
Continental Wire Corp., York, Penna. (July 2-July 9)
Converse Rubber Co., Malden, Mass. (July 29-Aug. 12)
Cooper Tire & Rubber Co., Findlay, Ohio (Aug. 28-Sept. 5)
Crescent Co., Pawtucket, R. I. (July 1-July 16)
Crown Products Co. (June 23-July 10)
Crunden Martin Mfg. Co., St. Louis, Mo. (June 30-July 16)
Cupples Co., St. Louis, Mo. (Aug. 21-Sept. 5)

D

Darling Valve & Mfg. Co., Williamsport, Penna. (July 3-July 17)
Davol Rubber Co., Providence, R. I. (July 14-July 31)
Delford Rubber Co., Middletown, N. Y. (July 24-Aug. 6)
Denman Rubber Mfg. Co., Warren, Ohio (July 1-July 10)
Dill Mfg. Co., Cleveland, Ohio (July 3-July 15)
Dunlop Tire & Rubber Corp., Buffalo, N. Y. (July 24-Aug. 7)
E. I. du Pont de Nemours & Co., Fabrics Plant, Fairfield, Conn. (July 10-July 21)
Durable Display Mfg., Inc., Chicago, Ill. (July 1-July 16)
Durkee-Atwood Co., Red Wing, Minn. (June 23-July 10)

E

Eagle Rubber Co., Ashland, Ohio (July 2-July 8)
Eastern Molding Co., Belleville, N. J. (July 1-July 12)
Easthampton Rubber Thread Co., Easthampton, Mass. (July 2-July 9); Stuart, Va. (July 1-July 10)
Eclat Rubber Co. Akron, Ohio (June 30-July 17)
Edmont, Inc., Coshocton, Ohio (July 3-July 17)
Electric Hose & Rubber Co., Wilmington, Del. (July 1-July 17)
Elgo Rubber Products Corp., Philadelphia, Penna. (July 1-July 16)
Elmhurst Rubber Co., Elmhurst, N. Y. (July 31-Aug. 14)
Endicott Johnson Corp., Endicott, N. Y. (July 16-July 22)
Enduro Rubber Co., Ravenna, Ohio (June 30-July 17)
Essex Rubber Co., Chelsea, Mass. (June 30-July 17)
Excel Rubber Co., Goshen, Ind. (July 1-July 17)
Eberhard Faber, Inc., Rubber Div., Newark, N. J. (July 3-July 17)

F

F. D. Farnam Co., Chicago, Ill. (July 1-July 16)
Faultless Rubber Co., Ashland, Ohio (June 25-July 2)
Federal Industries, Belleville, N. J. (July 3-July 15)
Fibre Leather Mfg. Corp., New Bedford, Mass. (July 1-July 17)
Firestone Rubber & Latex Products Co., Fall River, Mass. (July 3-July 10)
Flexible Tubing Corp., Guilford, Conn. and Anaheim, Calif. (July 3-July 11)
Fli-Back Co., High Point, N. C. (July 3-July 10)
Fo-Mar Enterprises, Inc., Tulsa, Okla. (June 29-July 17)

G

Garrett Flexible Products, Inc., Garrett, Ind. (June 26-July 10)
Gates Engineering Co., Wilmington, Del. (July 3-July 10)
Gavitt Wire & Cable Co., Escondido, Calif. (June 30-July 17); Brookfield, Mass. (June 30-July 17)
Geauga Industries Co., Middlefield, Ohio (July 15-July 31)
General Asbestos & Rubber Div., North Charleston, N. C. (July 3-July 17)
General Cable Corp., Rome, N. Y. (July 1-July 17); Perth Amboy, N. J. (July 15-July 31)
General Electric Co., Wire & Cable Purchasing Dept., Bridgeport, Conn. (July 31-Aug. 11, Dec. 22-Dec. 29); Lowell, Mass. (July 31-Aug. 11, Dec. 22-Dec. 29); Oakland, Calif. (July 31-Aug. 11)
General Insulated Wire Works, Providence, R. I. (June 30-July 17)
General Latex & Chemical Corp., Cambridge, Mass. (July 1-July 17)
General Latex & Chemical Corp. of N. C., Charlotte, N. C. (June 30-July 9)
General Latex & Chemical Corp. of Ohio, Ashland, Ohio (July 1-July 17)
General Rubber Corp., Tenafly, N. J. (July 17-July 31)
General Tire & Rubber Co., Akron, Ohio (Aug. 21-Aug. 28); Waco, Texas (Aug. 14-Aug. 21)
Globe Mfg. Co., Fall River, Mass. (July 1-17)
Goodall Rubber Co., Trenton, N. J. (July 24-Aug. 4)
Goodall Sanford, Inc., Reading, Mass. (July 3-July 10)
B. F. Goodrich Co., New Ulm, Minn. (July 24-July 31)
B. F. Goodrich Footwear & Flooring, Watertown, Mass. (July 15-July 31)
B. F. Goodrich Sponge Products, Shelton, Conn. (June 30-July 17)
B. F. Goodrich Textile Products, Thomaston, Ga. (July 2-July 8)
Goodyear Footwear Corp., Providence, R. I. (July 1-July 17)
Goodyear Rubber Co., Middletown, Conn. (July 2-July 15)
Goodyear Tire & Rubber Co., Windsor, Vt. (June 30-July 10)
Goodyear Tire & Rubber Co., New Bedford, Mass. (July 1-July 17)
Goshen Rubber Co., Goshen, Ind. (July 1-July 10)
Greene, Tweed & Co., North Wales, Penna. (July 3-July 11)

H

Haartz-Mason, Inc., Watertown, Mass. (June 30-July 10)
Hagerstown Rubber Co., Hagerstown, Md. (June 30-July 10)
Haveg Industries, Inc., Taunton, Mass. (June 30-July 14)
Henry Engineering Co., Moline, Ill. (June 26-July 10)
Hewitt-Robins, Inc., Fremont, Ohio (July 17-July 31); Buffalo, N. Y. (July 17-July 31)
Hiawatha Rubber Co., Minneapolis, Minn. (July 1-July 10)
Hodgman Rubber Co., Framingham, Mass. (July 31-Aug. 14)
Holland Rantos Co., Trenton, N. J. (July 17-July 31)
E. F. Houghton & Co., Hopkins, Minn. (June 30-July 11)
Houghton Vix-Syn Co., Hopkins, Minn. (July 1-July 10)
Huron Rubber Co., Norwalk, Ohio (June 30-July 10)

I

Ideal Roller & Mfg. Co., Chicago, Ill. (July 23-Aug. 7)
Ideal Tape, Inc., Lowell, Mass. (July 1-July 10)
Imperial Rubber Mfg. Co., Hackettstown, N. J. (June 30-July 9)
Industrial Electronic Rubber Co., Solon, Ohio (July 1-July 16)
Industrial Filter & Pump Mfg. Co., Cicero, Ill. (July 3-July 16)
Interchemical Corp., Coated Fabrics Div., Winthrop, Maine (July 3-July 17)
International Packings Corp., Bristol, N. H. (July 1-July 9)

J

Jacobs Rubber Div., Bullard Clark Co., Danielson, Conn. (July 2-July 8)
Jasper Rubber Co., Jasper, Ga. (July 1-July 8)
Jasper Rubber Products, Inc., Jasper, Ind. (July 1-July 10)
Jax Rubber Products Co., Jacksonville, Fla. (July 1-July 10)
Johns Manville Sales Corp., Chicago, Ill. (July 10-July 21)
Johnson & Johnson, New Brunswick, N. J. (July 16-July 30); Chicago, Ill. (Aug. 6-Aug. 20); Dallas, Texas (June 25-July 10)
Joy Mfg. Co., St. Louis, Mo. (Aug. 5-Aug. 20)

K

Karman Rubber Co., Akron, Ohio (July 1-July 9)
Kennecott Wire & Cable Div., Okonite Co., Phillipsdale, R. I. (July 2-July 16)
Kennedy Mfg. Corp., Stoughton, Mass. (July 3-July 17)
Kenworthy Brothers Co., Westboro, Mass. (June 30-July 17)
Kitco Eng. & Mfg. Co., Bluffton, Ind. (June 26-July 10)
I. B. Kleinert Rubber Co., College Point, N. Y. (July 24-Aug. 7)
Koneta Rubber Co., Wapakoneta, Ohio (June 30-July 9)

L

LaCrosse Rubber Mills Co., LaCrosse, Wisc. (June 29-July 25)
Laurel Co., Garfield, N. J. (July 15-Aug. 7)
Laurie Rubber Reclaiming Co., New Brunswick, N. J. (June 30-July 17)
Lavelle Rubber Mfg. Corp., Burlington, Wisc. (July 17-July 30)
Lee Rubber & Tire Corp., Conshohocken, Penna. (Aug. 12-Aug. 21, Dec. 23-Jan. 2, 1962)
James Lees & Sons Co., Glasgow, Va. (July 1-July 10)
W. S. Libbey Co., Lewiston, Maine (July 1-July 14)
Lloyd Mfg. Co., Warwick, R. I. (July 1-July 16)

M

MacGregor Sport Products, Inc., Cincinnati, Ohio (Spring Grove Ave. Aug. 21-Sept. 5); (Findlay St. June 26-July 10)
Manhattan Rubber Roll Div., North Charleston, S. C. (July 3-July 17)
Mansfield Tire & Rubber Co., 515 Newman St., Mansfield, Ohio (July 1-July 9); Oakland, Calif. (Dec. 25-Dec. 31)
Martin Rubber Co., Long Branch, N. J. (July 22-Aug. 6)
Martins Ferry Glove Co., Uhrichsville, Ohio (June 30-July 10)
Mayfair Molded Products Corp., Schiller Park, Ill. (July 3-July 14)
McCormick Rubber Co., Ridgefield Park, N. J. (July 7-July 24)
Mercer Rubber Co., Trenton, N. J. (July 17-Aug. 1)
Metal Hose & Tubing Co., Dover, N. J. (June 30-July 24)
Middletown Rubber Corp., Middletown, Conn. (June 30-July 10)
Mid-States Rubber Products, Inc., Princeton, Ind. (Aug. 20-Aug. 27)
Midwest Rubber Reclaiming Co., Paramount, Calif. (July 31-Aug. 14)
Mine Safety Appliances Co., Pittsburgh, Penna. (July 21-Aug. 7)
Minnesota Rubber Co., St. Louis Park, Minn. (June 30-July 18)
Molded Rubber Specialties, Painesville, Ohio (June 30-July 16)
Morningstar-Paisley, Inc., Clifton, N. J. (July 3-July 17)

N

Nafi Corp., Trenton, N. J. (June 23-July 10)
Navarm Chemical & Rubber Co., Woodland Hills, Calif. (Aug. 14-Aug. 21)
Neff-Perkins Co., Painesville, Ohio (June 30-July 16)
Neo-Sil Rubber Products, Inc., Akron, Ohio (June 30-July 10)
New Jersey Rubber Co., Taunton, Mass. (July 1-July 17)
Newth Rubber Co., Barrington, R. I. (July 1-July 16)
Nichols Engineering, Inc., Shelton, Conn. (July 15-July 31)
Nopco Chemical Co., Harrison, N. J. (July 1-July 17); Richmond, Calif. (Aug. 5-Aug. 20)
Nye Rubber Co., Barberton, Ohio (July 1-July 9)

O

Odell Co., Watertown, Mass. (July 1-July 10)
Oil States Rubber Co., Arlington, Texas (June 10-June 19)
Okonite Co., North Brunswick, Passaic and Paterson, N. J. (July 2-July 17)
Omo Mfg. Co., Middletown, Conn. (June 30-July 10)
O'Sullivan Rubber Corp., Winchester, Va. (July 1-July 11)
Ottawa Rubber Co., Bradner, Ohio (July 2-July 17)

P

Pacific Coast Div., Raybestos-Manhattan, Fullerton, Calif. (June 30-July 10)
Pacific Latex Co., Los Angeles, Calif. (July 1-July 10)
Passaic Rubber Co., Clifton, N. J. (July 17-July 30)
Paul-Martin Rubber Corp., Holyoke, Mass. (July 1-July 17)
Pellon Corp., Lowell, Mass. (July 1-July 10)
Pelmor Laboratories, Inc., Newtown, Penna. (July 24-Aug. 5)
Pendleton Mfg. Co., LaFrance, S. C. (July 2-July 10)
Perry Rubber Co., Massillon, Ohio (July 1-July 16)
Pioneer Rubber Co., Willard, Ohio (July 1-July 17)
Plabell Rubber Products, Inc., Toledo, Ohio (July 1-July 9)
Plasticcid Co., Elkton, Md. (July 24-Aug. 7)
Plymouth Rubber Co., Canton, Mass. (June 30-July 10)
Don Post Studios, North Hollywood, Calif. (July 1-July 15)
Precision Rubber Products Corp., Dayton, Ohio (July 31-Aug. 14); Lebanon, Tenn. (July 10-July 17)
Precision Thread Co., Fall River, Mass. (July 1-July 16)
Premier Rubber Mfg. Co., Dayton, Ohio (July 1-July 16)
Pretty Products, Inc., Coshocton, Ohio (June 26-July 10)
Pulaski Rubber Co., Pulaski, Tenn. (July 3-July 10)
Pyramid Rubber Co., Ravenna, Ohio (July 1-July 16)

Q

Quality Products Mfg. Co., Gardena, (July, 1961)

R

Rainfair, Inc., Racine, Wisc. (June 30-July 17)
Rapid Roller Co., Chicago, Ill. (July 24-Aug. 5)
Raybestos Div., Raybestos-Manhattan, Stratford, Conn. (July 17-July 24)
R.C.A. Rubber Co., Akron, Ohio (June 30-July 17)
Rhee Elastic Thread Corp., Warren, R. I. (July 9-July 30)
Richardson Co., Melrose Park, Ill. (June 26-July 9); Indianapolis, Ind. (June 26-July 9); New Brunswick, N. J. (June 26-July 9); Tyler, Texas (June 12-June 25); Ogden, Utah (June 19-July 1)
Robbins Plastics & Rubber, Inc., Cedarburg, Wisc. (July 1-July 18)
Rodic Chemical & Rubber Corp., New Brunswick, N. J. (July 1-July 24)
Rogers, Corp., Willimantic Div., Willimantic, Conn. (July 3-July 10)
Rome Cable Corp., T. J. Cope Div., Collegeville, Penna. (June 30-July 11)
Ronther Reiss Corp. Ronsil Products Div., Little Falls, N. J. (July 15-July 30)
Roth Rubber Corp., Cicero, Ill. (July 15-July 30)
Royal Electric Corp., Pawtucket and Woonsocket, R. I. (July 1-July 17)
Rubber & Asbestos Corp., Bloomfield, N. J. (June 29-July 10)
Rubber Corporation of America, Hicksville, N. Y. (July 1-July 18)
Rubber Latex Co. of America, Clifton, N. J. (June 30-July 9)
Rubber Millers, Inc., Baltimore, Md. (Aug. 1-Aug. 21)

S

Sandura Co., Fullerton, Penna. (July 3-July 16)
Scandura, Inc., Charlotte, N. C. (June 30-July 18)
Frank G. Schenuit Rubber Co., Baltimore, Md. (July 31-Aug. 14)
Julius Schmid, Inc., New York, N. Y. (Aug. 14-Aug. 27); Little Falls, N. J. (Aug. 13-Aug. 27)
A. Schrader's Son Div., Scovill Mfg. Co., Brooklyn, N. Y. (July 24-Aug. 7)
Scully Rubber Mfg. Co., Baltimore, Md. (July 3-July 10)
Seamless Rubber Co., New Haven, Conn. (July 31-Aug. 11) (Offices will be Open)
Seiberling Rubber Co., Barberton, Ohio (Aug. 26-Sept. 5)
Servus Rubber Co., Rock Island, Ill. (July 14-Aug. 7)
Shellier Mfg. Corp., Portland, Ind. (July 1-July 9)
Shep Rubber Mfg., Inc., St. Louis, Mo. (July 1-July 10)
Simplex Wire & Cable Co., Cambridge, Mass. (July 16-July 30)
Sloan Valve Co., Chicago, Ill. (July 10-July 24)
Slomons Laboratories, Inc., Long Island City, N. Y. (June 30-July 15)
M. L. Snyder & Son, Inc., Philadelphia, Penna. (July 3-July 18)
South Haven Rubber Co., South Haven, Mich. (July 1-July 10)
Stalwart Rubber Co., Bedford, Ohio (June 24-July 9)
Stauffer-Hewitt, Inc., Franklin, N. J. (June 29-July 16)
Stedfast Rubber Co., Mattapan and North Easton, Mass. (June 30-July 10)
Stokes Molded Products, Trenton, N. J. (July 1-July 17)
Surety Rubber Co., Carrollton, Ohio (July 2-July 9)
Syracuse Rubber Products Co., Syracuse, Ind. (July 3-July 17)

T

T & M Rubber Specialties Co., Goshen, Ind. (July 3-July 10)
Technical Industries, Inc., Wakefield, R. I. (June 30-July 17)
Thermoid Div., H. K. Porter Co., Trenton, N. J. (July 16-July 23)
Tigron Latex & Chemical Corp., Stoughton, Mass. (June 30-July 7)
Titeflex, Inc., Springfield, Mass. (June 30-July 10)
Tompkins Rubber Co., Plymouth Meeting, Penna. (July 31-Aug. 14)
Triangle Conduit & Cable Co., New Brunswick, N. J. (June 30-July 17)
Tyer Rubber Co., Andover, Mass. (July 30-Aug. 12)

U

UBS Chemical Co., Cambridge, Mass. (July 3-July 16)
United States Asbestos Div., Raybestos-Manhattan, Manheim, Penna. (June 30-July 10)
United States Rubber Co., Santa Ana, Calif. (June 30-July 17); Chicago, Ill. (June 29-July 17); Detroit, Mich. (June 26-July 10); Indianapolis, Ind. (June 19-July 10); Philadelphia, Penna. (July 9-July 24); Mishawaka, Ind. (July 17-Aug. 7); Naugatuck, Conn. Footwear Plant (July 21-Aug. 11); Naugatuck Chemical Div., Naugatuck, Conn. (July 10-July 23); Reclaim Plant, Naugatuck, Conn. (July 3-July 9 and July 31-Aug. 13); Synthetic Plant, Naugatuck, Conn. (July 31-Aug. 13)

V

Vail Rubber Works, Inc., St. Joseph, Mich. (July 2-July 16)
Varflex Corp., Rome, N. Y. (June 30-July 16)
Vellumoid Co., Worcester, Mass. (July 17-July 30)
Venus Pen & Pencil Corp., Hoboken, N. J. (July 17-July 28)
Victor Balata & Textile Belting Co., Easton, Penna. (July 21-July 31)
Victor Mfg. & Gasket Co., Chicago, Ill. (July 8-July 23)
Virginia Chemical Corp., Lynchburg, Va. (July 3-July 8)
W. J. Voit Rubber Corp., Los Angeles, Calif. (June 23-July 11); 2945 E. 12th St., Santa Ana, Calif. (June 23-July 11); 3701 Huntzinger, Santa Ana, Calif. (June 30-July 10)

W

Wabash Div., Raybestos-Manhattan, Crawfordsville, Ind. (June 30-July 17)
Walker Brothers, Conshohocken, Penna. (July 10-July 16; Aug. 7-Aug. 13)
Waukesha Rubber Co., Waukesha, Wisc. (July 3-July 17)
Weldon Roberts Rubber Co., Newark, N. J. (July 1-July 16)
Wellco Shoe Corp., Waynesville, N. C. (July 1-July 16)
West Co., Phoenixville, Penna. (July 31-Aug. 14); Millville, N. J. (July 10-July 24)
Western Insulated Wire Co., Los Angeles, Calif. (Aug. 7-Aug. 14)
Western Rubber Co., Goshen, Ind. (July 31-Aug. 6)
S. S. White Dental Mfg. Co., Staten Island, N. Y. (July 3-July 11)
White Rubber Co., Ravenna, Ohio (July 3-July 17)
Willard Tire Co., Woodland Hills, Calif. (Aug. 14-Aug. 21)
Williamson Co., Madison, Ind. (June 23-July 10)
Wilson Rubber Co., Canton, Ohio (July 1-July 17)
Wisconsin Rubber Products, Inc., Union Grove, Wisc. (Aug. 13-Aug. 19)
Worthington Ball Co., Elyria, Ohio (Aug. 19-Sept. 5)

Y

Youngs Rubber Corp., Trenton, N. J. (July 17-July 31)

CANADA

A

Acton Rubber, Ltd., Acton Vale, Que. (July 17-July 30)
Anchor Packing Co., Montreal, Que. (July 10-July 24)
Armet Industries, Ltd., Rubber & Plastics Div., Guelph, Ont. (July 21-Aug. 8)

B

Bata Shoe Co. of Canada, Ltd., Batawa, Ont. (July 22-Aug. 8)
B. B. Chemical Co. of Canada, Ltd., Montreal, Que. (July 7-July 24)
Biltrite Tire Co., Toronto, Ont. (June 30-July 17)
Borden Chemical Co. (Canada), Ltd., West Hill, Ont. (July 17-July 31)
British Rubber Co., Lachine, Que. (July 10-July 22)

C

Canadian Technical Tape, Ltd., St. Laurent, Que. (July 15-July 30)
Canadian General-Tower, Ltd., Galt, Ont. (July 21-Aug. 8)
Chase & Sons Electrical Insulating Materials, Ltd., Tillsonburg, Ont. (July 1-July 16)
Continental Rubber Co., Edmonton, Alberta (July 10-July 22)

D-F

Dominion Silk Mills, Ltd., Fabricushon Div., Toronto, Ont. (July 22-Aug. 7)
Dunlop Canada, Ltd., Whitby Plant (July 29-Aug. 13)
Firestone Textiles, Ltd., Woodstock, Ont. (July 31-Aug. 11)
Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont. (July 31-Aug. 11)

G

General Tire & Rubber Co. of Canada, Ltd., Industrial Products Div., Welland, Ont. (July 14-July 31)
B. F. Goodrich Canada, Ltd., Kitchener, Ont. (July 29-Aug. 8)
B. F. Goodrich Sponge Products Canada, Ltd., Waterville, Que. (July 17-July 31)
G. L. Griffith & Sons, Ltd., Stratford, Ont. (July 24-Aug. 5)
Gro-Cord Rubber Co. of Canada, Ltd., Tillsonburg, Ont. (July 1-July 16)

K

Kaufman Rubber Co., Kitchener, Ont. (July 24-Aug. 8)

M

Mansfield Rubber (Canada), Ltd., Barrie, Ont. (July 28-Aug. 14)
Miner Rubber Co., Granby, Que. (July 2-July 15)

P

Phillips Electrical Co., Brockville, Ont. (July 24-Aug. 7)
Pirelli Cables Conduits, Ltd., St. Johns, Que. (July 14-July 31)
Precision Rubber Products Corp., Ste. Therese de Blainville, Que. (July 3-July 17)

R

Raybestos-Manhattan (Canada), Ltd., Peterborough, Ont. (July 24-Aug. 8)
Joseph Robb & Co., Montreal, Que. (July 10-July 24)
Rubbermaid (Canada), Ltd., Cooksville, Ont. (July 28-Aug. 8)

S-U

M. L. Snyder & Son, Ltd., Woodbridge, Ont. (July 14-July 28)
Usher Plastics, Ltd., Brampton, Ont. (July 14-July 30)

Y

Yale Rubber Mfg. Co. of Canada, Ltd., Kincardine, Ont. (July 24-Aug. 4); Toronto, Ont. (July 21-Aug. 7)

EXTRA COPIES of this vacation schedule needed for your files? Address the Editor. RUBBER AGE, 101 W. 31st St., New York 1, N. Y.

Midland-Ross Merges

► Shareholders of Industrial Rayon Corp. and Midland-Ross Corp. have approved a merger plan under which Industrial Rayon will operate as a division of Midland-Ross. The vote was conducted at separate stockholders meetings held in Cleveland, Ohio. Terms of the merger agreement provide that each share of Industrial Rayon common stock will be converted into two-fifths of a share of Midland-Ross common stock, bringing the total number of Midland-Ross common shares outstanding to 1,422,527. Frederick L. Bissinger, president of Industrial Rayon, becomes a group vice-president of Midland-Ross, and will continue to direct the activities of the rayon company. L. Louis Malm, formerly vice-president in charge of research and engineering for Industrial Rayon, has been elected vice-president of Midland-Ross and general manager of Industrial Rayon. In his new post, he will be in charge of all operations of Industrial Rayon.

Goodyear Offers Latices

► Two new butadiene-styrene synthetic rubber latices have been put into commercial production by the Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio. The new materials, Pliolite 440 and Pliolite 460, are recommended for textile and carpet backings, binders for non-woven fabrics, scrim adhesives for carpets, and for saturating and coating applications with paper. Both are low viscosity latices, modified with chemicals known as carboxylics to provide better overall physical properties, and faster, more economical curing.

As a result of these carboxylics, the company reports, processors can use zinc oxide as well as conventional cures. The new latices also contain an antioxidant for better aging qualities. Goodyear states that the chief difference between the two synthetics is that Pliolite 460 imparts resinous properties which result in stiffer hand or body in the end product.

New Montecatini Rubbers

► Montecatini, Milan, Italy, has introduced three new synthetic rubbers which will be produced at the petrochemical plant now under construction at Brindisi. The new rubbers are Elaprim, Dutral, and Astyr. Elaprim is described as a copolymer of butadiene and acrylonitrile. It is said to have good resistance to oils and aliphatic hydrocarbons, and can be processed by normal machinery. It is expected to find applications in the petroleum, motor, textile, and chemical industries. Dutral is an ethylene propylene copolymer with elastic properties similar to natural rubber. It is reported to offer high resistance to heat, oxygen, ozone, and mineral agents, as well as lightness and low cost. Astyr is a 1,4-*cis* polybutadiene which is expected to prove of value as a replacement for natural rubber in tires, including heavy duty types. It is claimed that vulcanizates have better flexibility and elasticity than natural compounds.

Keener Optimistic

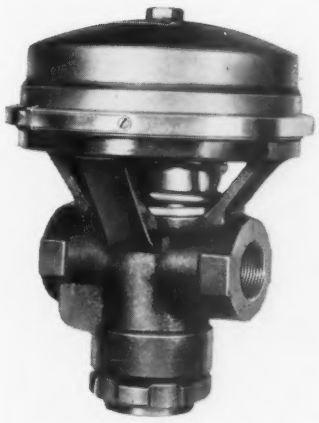
► "The bottom of the recession for B. F. Goodrich, and for most of the rubber industry, occurred in January and February of this year, and we expect B. F. Goodrich and rubber industry trends to be upward through the remainder of 1961," J. W. Keener, president and chief executive officer of the B. F. Goodrich Co., Akron, Ohio, told the annual meeting of stockholders, held recently in New York City. Goodrich capital expenditures in 1961 should reach $50,000,000, he said, the highest total in the history of the company.

"While a majority of the funds spent in 1961 will go toward construction of expansion projects, such as the new Indiana and Canadian tire plants," Mr. Keener added, "much will go into further mechanization and modernization of existing production facilities. We expect a continued high level of capital expenditures over the next several years directed primarily to chemical and non-tire lines. Much management attention and money will be invested in further improving our productive research and development programs, with special emphasis on research in the chemical field."

The Goodrich president said that the purchase of the Rayco Manufacturing Co., with 140 metropolitan locations, earlier this year would "significantly strengthen the company's passenger car tire distribution." He also announced that three substantial private brand tire accounts had been signed by his company within the past four months with production for the accounts now under way.

Opens Research Facility

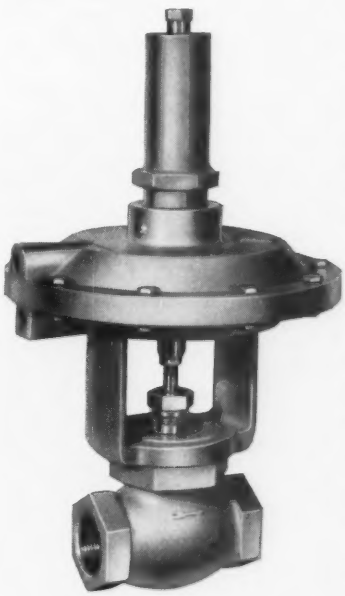
► Southern Clays, Inc., New York, N. Y., has opened a new research laboratory and separate pilot plant, both located on a 90-acre site near Gordon, Georgia. The 16,000 square foot laboratory is subdivided into five main groupings: functional research, ceramics, paper, new product development, and organic applications—primarily paint, rubber and plastics. Facilities include instrument rooms, dark room, constant humidity room, library, conference and reception rooms, and offices. The pilot plant is in a separate 6,000 square foot building located about 200 feet from the laboratory. The staff will be assigned to work on new clay developments, as well as offer technical assistance to customers.



New No. 1078 Series Valve. A small, compact piston-actuated valve designed for Hot and Cold Service up to 400 psi and 400°F. Ductile iron body and spider give added strength, low coefficient of expansion. Sizes 1″, 1¼″ and 1½″. Half the number of parts of a diaphragm operated valve, and exceptionally simple design insure long, trouble-free service.

NEW

TAYLOR 1000 SERIES AND 1078 SERIES VALVES DESIGNED FOR HOT AND COLD SERVICE



New No. 1000 Series Valve features exclusive reversible actuators for "air-to-open" or "air-to-close" service. Suitable for hot or cold service to 200 psi; cold service only up to 400 psi. Bronze body with choice of Monel seat and disc, or stainless steel bevel plug and seat of 500 Brinell hardness. Sizes range from ¼″ to 3″. Actuator springs completely enclosed, diaphragms of Neoprene reinforced with Nylon. Provides ideal, low-cost pneumatic control for "on-off" service. Ask your Taylor Field Engineer for full details. Or write Taylor Instrument Companies, Rochester, New York or Toronto, Ontario.

Taylor Instrument Co. (Ohio) Inc.

New Auburn Materials

► Two new products, solid urethane sheets said to be useful as liner materials, and an asbestos Teflon material which reportedly can be used in the temperature range of —425° to 500°F., have been developed by the Auburn Manufacturing Co., Middletown, Conn. The solid urethane sheets are made from new compounds, and include a fabric-backed urethane sheet measuring 40 x 96 inches, in over-all gauges of 1/16-inch, ⅛-inch, and ¼-inch. According to the company, the sheets show excellent abrasion resisting qualities, and since thinner gauges of materials may be used, offer reduced maintenance and installation time.

The new Teflon-filled asbestos has a high thermal expansion coefficient and low resistance to deflamation under loads, particularly at elevated temperatures. Advantages claimed for the material are that it is inert to most chemicals, is completely unaffected by solvents, lubricants, hydraulic fluids, or any of the common fuels, and has fine dielectric properties and excellent thermal dimensional stability.

Soviet Rubber Research

► Rubber research in the Soviet Union will equal, and may exceed, that of the United States within ten years, according to Dr. David Craig, scientist at the research center of the B. F. Goodrich Co., Akron, Ohio. Speaking at a meeting of the Akron section of the American Chemical Society, Dr. Craig stated that "we should not look down our noses at Russia." The scientist visited institutes of rubber research in Moscow and Leningrad in 1959 to assess Russian research ability and achievements and found that, despite inadequate facilities, well-trained scientists are making rapid headway. One incentive to achievement, he declared, has been the democratizing of their Academy of Arts and Sciences. Previously, members had to be elected, whereas now "good work" will earn a government appointment to the body.

Admiral Machine Expands

► Admiral Machine Co., Barberton, Ohio, has purchased the 17,000 square foot building, formerly owned by Carlson Manufacturing Co., to house its Mold Division. The transaction was reported to involve about $50,000.

J. W. Street

Named Vice-President

► Dr. John N. Street has been elected to the newly-created post of vice-president in charge of research for the Firestone Tire & Rubber Co., Akron, Ohio. Dr. Street, director of the chemical laboratories at Firestone for the past 12 years, graduated from Syracuse University with a B.A. degree in chemistry in 1921 and later received his M.S. degree in chemistry from that school. He received his Ph.D. in organic chemistry-physical chemistry from the University of Wisconsin in 1926. That year he joined Firestone as a research chemist, and two years later was appointed assistant director of research. In 1936 he was named director of research, and prior to World War II was placed in charge of the synthetic rubber development program then under way at the Firestone Tire & Rubber Co.

During 1941-1943, he served as official company representative on the government's Technical Committee on Synthetic Rubber, Office of Rubber Reserve. Dr. Street was appointed assistant director of all Firestone's laboratories in 1944, and the following year was one of the industry representatives sent to Europe by the Rubber Reserve to investigate German research and development programs for synthetic rubber. The discoveries of this committee led to the practical development in this country of cold rubber in 1946, while Dr. Street was manager of research and development of synthetic rubber for the Office of Rubber Reserve.

Aero Awarded Patent

► Aero Service Corp., Philadelphia, Penna., has been assigned U. S. Patent No. 2727883 on the process of polymerizing Thiokol liquid polymers, using iodine as a catalyzer. The inventor is Walther L. A. Barth. The new methods have been employed in the production of 9 x 36 foot polysulfide rubber castings weighing up to 2200 pounds. Previously, the standard procedure was a lead peroxide method or a method employing cumene hydroperoxide in a basic medium. The advantage of the new process, according to Aero Service, is that pot-life can be varied over a range from a few seconds to more than 10 hours, whereas the pot life for mixtures produced under the old process was limited to less than two hours. In addition, the company reports, a greater hardness is obtained with the iodine method, plus improved stability of the end product.

Goodrich 2-Ply Tire

► B. F. Goodrich Co., Akron, Ohio, has developed a two-ply tire for use on compact cars said to have the same carcass strength as standard four-ply tires. The new tire, according to the company, is lighter in weight, softer riding and cooler running than present tires for compacts and is equal to the four-ply tire in strength, endurance and tread wear. Goodrich states that while the new tire has only two layers of Tyrex rayon cord in the tire body, its cords are much larger and stronger than those used in conventional tires, and tire strength is related directly to the quality and weight of cord used. Since the new tire has a thinner sidewall and fewer plies to generate internal friction, it allows increased flexing without excessive heat build-up and gives a softer ride.

Buys Kennedy Van Sahn

► McNally Pittsburg Manufacturing Corp., Pittsburg, Kansas, has acquired the Kennedy Van Sahn Manufacturing and Engineering Corp., Danville, Penna. The purchase was made through the acquisition of the common stock holdings of Byron H. Pyle, president of the firm, and those of members of the family of Joseph E. Kennedy, founder of the concern. The purchase was reported to be a straight cash transaction, but the amount involved was not disclosed.

Army Develops Synthetic

► A synthetic rubber that will not freeze in space or in the Antarctic has been developed under a contract with the Quartermaster Research and Engineering Command of the U. S. Army. The new rubber, described as a copolymer of trifluoronitrosomethane and tetrafluoroethylene, is said to be non-inflammable, perfectly flexible at temperatures as low as —40° F., and highly resistant to deterioration from hydrocarbon fuels and gasoline. According to the Quartermaster Corps, it is the only completely fireproof, non-inflammable rubber known. It may be used as a coating for fabrics in rockets and missiles, and as a binder for solid fuel propellants, as well as in flexible, easily transportable and quickly laid pipe lines for petroleum and its products. A major problem of the new synthetic, which is still in the experimental stage, is how to achieve mass production economically. Cooperating in the research are the Quartermaster Corps' laboratories, Minnesota Mining & Manufacturing Co., and the Universities of Florida and California.

Cabot Appoints Four

► Four appointments to its technical research staff have been announced by the Cabot Corp., Boston, Mass. Dr. Victor D. Aftandilian, formerly with DuPont, has joined the Organic and Polymer Research Section as a research chemist. Robert G. Nuttle, previously associated with the Linde Co., has joined the New Product Research Department as a chemist. George G. March, formerly plant manager with Santa Ana Plastics, a division of Rexall Drug and Chemical Co., has been appointed a group leader in charge of CAB-XL research at Cabot's Watertown, Mass., pilot plant. Francis Heckman, previously associated with W. R. Grace & Co. as an electron microscopist, has joined the Carbon Black Research Department as a group leader in the electron microscopy laboratory.

Gaylord Organizes Firm

► Dr. Norman G. Gaylord, formerly vice-president of research and development for the Polymer Division of the Western Petrochemical Corp., has left the company to become an independent polymer consultant. He has organized a firm called Gaylord Associates, Inc., New Providence N. J., which will carry out contract laboratory research in the organic and polymer fields.

Jack Wright

Joins Falls Engineering

► Falls Engineering & Machine Co., Cuyahoga Falls, Ohio, has named Jack Wright as southwestern sales representative. He will cover Mississippi, Louisiana, Arkansas, Oklahoma, Texas, and Tennessee west of the Tennessee River. Mr. Wright attended Columbia Business College and Southwestern University. He had worked for the Firestone Tire and Rubber Co., first as a member of its IBM department in Memphis, and later as a member of the company's sales organization. After serving in the Army during World War II, he joined the Moto-Mower Co. as regional sales manager. Before joining Falls Engineering, he was sales manager for a national manufacturer of latex rubber products.

Swan Merger Approved

► Stockholders of Swan Rubber Co., Bucyrus, Ohio, have approved the purchase of the company by Amerace Corp., New York, N. Y., for $22,220,400 in cash. No Amerace stock was involved in the transaction. Officials of Amerace state that Swan will continue to operate under its present management as the eighth division of the company. The name of the new division has been changed to Swarco, Inc. In its fiscal year, which would have ended July 31, 1961, Swan expected sales of approximately $22,700,000, and net profits of approximately $3,500,000 before federal income taxes. Officials of Amerace report that the acquisition will almost double its sales and will add materially to its profits. The present seven divisions of Amerace Corp. had sales of $27,700,000, and earnings of $3,255,000 in the fiscal year ended December 31, 1960.

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Names in the News

Edward P. Collins, Jr., formerly with American Hard Rubber Co., has joined Arnold, Hoffman & Co., Providence, R. I., as a chemist in process development.

Dr. Alexander E. Vajda, formerly with Hooker Chemical Corp., has joined the Armour Research Foundation, Chicago, Ill., as group leader of polymer research.

Jerome J. Lawson has been appointed manager of advertising and promotion of the Organic Chemicals Division of the American Cyanamid Co., Bound Brook, N. J., succeeding **M. B. Friedman,** who has been named merchandising manager of the company's Fibers Division.

Byron C. Bailey, previously research engineer in the Research and Development Department of the United Carbon Co., Baytown, Texas, has been appointed project engineer.

William H. White, treasurer of Raybestos - Manhattan, Inc., Passaic, N. J., was honored by the firm on reaching 45 years of service with the company. **James J. De Mario,** advertising and publicity manager for R-M, was presented with a Pioneer Pin with five diamonds for reaching 50 years of service.

William P. Bray, Jr., a senior buyer at the Firestone Tire & Rubber Co., Akron, Ohio, has been elected a vice-president of the National Association of Purchasing Agents.

Lee Hennessy has joined the Industrial Electronic Rubber Co., Solon, Ohio, as technical director.

Dr. Aubrey R. McKinney, formerly senior research scientist at Standard Oil (Ind.), has become head of Synthetic Polymers, a consulting firm, in Whiting, Ind.

Ralph C. Schaeffer has been appointed district sales manager at Salt Lake City, Utah, for the Western Industrial Chemicals Division of Pennsalt Chemicals Corp.

George W. Prehler has joined Stauffer-Hewitt, Inc., Franklin, N. J., as manager of manufacturing.

John I. Gmitro has joined the research center of the Shell Development Co., Emeryville, Calif., as an engineer in the Oil Process Engineering Department.

George Moore, formerly sales supervisor in Japan for the Goodyear Tire & Rubber Co., Akron, Ohio, has been named managing director of Goodyear-Singapore.

Elmer G. Kimmich, chief engineer for industrial products development at Goodyear Tire & Rubber Co., Akron, Ohio, has retired after 45 years with the company.

Dr. Alan N. Gent, formerly principal physicist in charge of applied physics and engineering research and development with the Natural Rubber Producers' Research Association, has joined the University of Akron's Institute of Rubber Research as professor of polymer physics and research associate.

G. Edward Bellew, formerly vice-president and general manager of the Baltimore Steel Co., has joined Garlock, Inc., Palmyra, N. Y., as manager of the Manufacturing Division.

Dr. S. Z. Perry, formerly head of the Analytical Department, has been appointed manager of the Service Division at the research center of the Shell Development Co., Emeryville, Calif.

William M. Larson, originator of the translucent tire at the Goodyear Tire & Rubber Co., Akron, Ohio, has been presented wtih the Dinsmore Merit Award, the company's highest merit award.

Charles H. Baldwin, formerly general sales manager of manufacturers' products, has been appointed production manager of the Footwear and General Products Division of the United States Rubber Co., New York, N. Y.

D. C. French, formerly with Goodyear Tire & Rubber Co., has been named manager of tire engineering for Mohawk Rubber Co., Akron, Ohio.

Donald J. Harrington, formerly assistant head of the Chemical Technical Service Division at the Humble Oil & Refining Co., Bayway, N. J. has joined the Industrial Chemicals Division of the Enjay Chemical Co. New York, N. Y.

John G. Ragsdale, formerly assistant to the executive vice-president of the General Tire & Rubber Co., Akron, Ohio, has been appointed director of the newly-formed Trade Relations Department.

George B. Koch, Jr., formerly advertising manager of industrial and commercial products for the B. F Goodrich Co., Akron, Ohio, has been named merchandising manager for B. F. Goodrich Industrial Products Co. He is succeeded by **George A. Mentzer,** formerly manager of trade advertising and sales promotion for the B. F. Goodrich Chemical Co. in Cleveland, Ohio.

Jacqueline Lee Susie, 17 - year - old daughter of Dr. A. G. Susie, manager of rubber and polymer research and development at the United Carbon Co., Inc., Houston, Texas, has won a United Carbon Merit Scholarship.

D. C. Maddy, previously vice-president of the Harwick Standard Chemical Co. of California, has been elected executive vice-president.

Prof. Herman F. Mark, director Polymer Research Institute, Polytechnic Institute of Brooklyn, N. Y., and **William O. Baker,** vice-president of research, Bell Telephone Laboratories, Murray Hill, N. J., have been elected members of the National Academy of Sciences.

E. W. Vaill has been appointed technical service consultant for the Union Carbide Plastics Co., New York, N. Y.

Howard Shannon, president of the American Hard Rubber Co., has been elected vice-president of the parent firm, Amerace Corp., New York, N. Y.

Harold C. Steadman, vice-president of the Richardson Co., Melrose Park Ill., has been elected to the board of directors.

Dr. Edward S. Jones has joined the General Chemical Division of Allied Chemical Corp., Morristown, N. J.

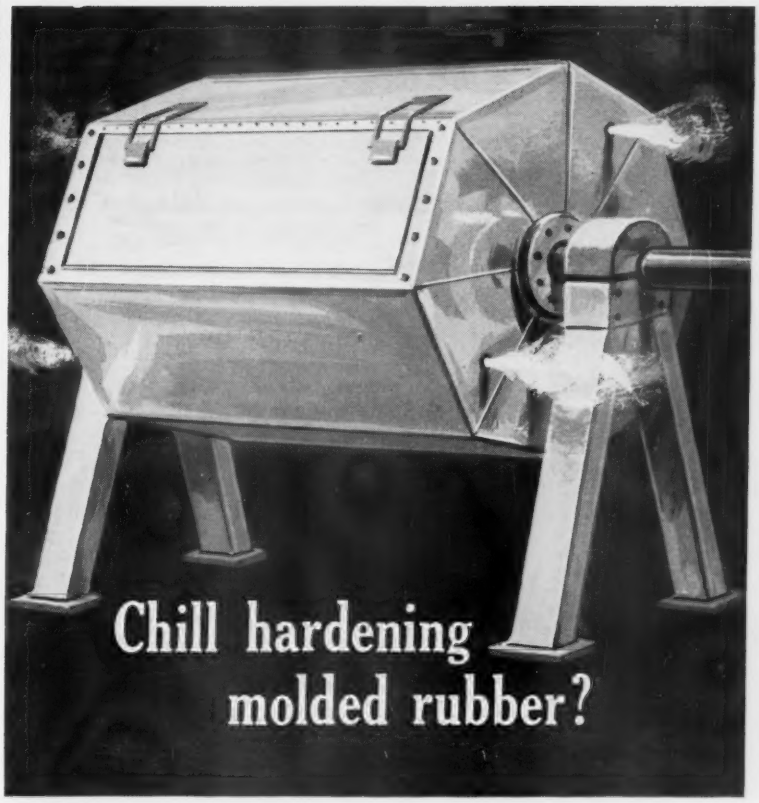
W. C. Capehart

Joins Dewey and Almy

► William C. Capehart has joined the Dewey and Almy Chemical Division of W. R. Grace & Co., Cambridge, Mass., as field sales representative for the Organic Chemicals Division. He will be responsible for sales of Dewey and Almy's vinyl acetate polymer and copolymer emulsions, butadiene - styrene resins and latices, vinylidene chloride polymer latices, plasticizers, and dispersing agents in Texas, Oklahoma, Arkansas, Mississippi, Louisiana and western Tennessee. Mr. Capehart received a B.S. degree in chemistry from Mississippi College in 1943, and an M.A. in chemistry from the University of Texas in 1951. He has served with the P. P. Williams Co. and, prior to joining Dewey and Almy, was associated with the Plastics Division of the Monsanto Chemical Co.

New Hycar Polymer

► A new modified polybutadiene polymer said to have excellent abrasion and low temperature resistance has been introduced by B. F. Goodrich Chemical Co., Cleveland, Ohio. The company states that the new polymer, Hycar 1000X145, will not become brittle even at temperatures as low as —85°F., and also has moderate resistance to the effects of fuels, solvents and chemicals. According to Goodrich, these characteristics, coupled with the polymer's excellent electrical properties and ozone resistance, make it an ideal material for use in the electrical wire and cable field. Other applications foreseen by the company include shoe soles and heel lifts, machine parts where abrasion resistance is important, hose coverings, and as a coating material for fabrics.



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Financial News

Goodrich

► First quarter: Net income amounted to $5,763,525, equal to 63c per share, compared with $9,078,543, or $1.01 per share, for the first three months of 1960. Net sales totaled $172,958,254, against $200,730,977 for the same period of 1960.

Armstrong Rubber

► Six months ended March 31: Net income of $1,884,616, equal to $1.11 per share, compares with $2,020,841, or $1.19 per share, for the same period a year before. Sales totaled $51,155,466, against $48,799,720 for the same period ended 1960.

U. S. Rubber

► First quarter: Net income of $5,204,918, equal to 68c per share, compares with $9,947,886, or $1.51 per share, for the same period in 1960. Sales totaled $219,550,530, against $254,099,601 for the like period a year ago.

Amerace

► First quarter: Earnings totaled $892,104, or $1.39 per share, compared with $259,335, or 39c per share, for the comparable period a year ago. Net sales came to $6,625,892, against $7,135,121 for the first quarter of 1960.

Goodall Rubber

► First quarter: Net income of $52,112, equal to 10c per share, compares with $61,568, or 13c per share, for the like 1960 period. Net sales came to $3,363,432, against $3,492,596 for the first quarter in 1960.

General Cable

► First quarter: Net income amounted to $1,402,601, or 49c per share, compared with $2,377,747, or 74c per share, for the comparable period a year ago.

Phillips Petroleum

► First quarter: Net income amounted to $27,506,000, equal to 80c a share, compared with $25,804,000, or 75c a share, in the comparable period a year earlier.

United Carbon

► For 1960: Net income from operations was $5,561,183, equal to $4.24 per share, compared with a net income of $6,635,314 in 1959, or $5.21 per share. Net sales and operating revenues amounted to $56,788,090, against $62,170,938 in 1959.

Triangle Conduit

► For 1960: Net income for the year was $318,860, equal to 23c per share, compared with a net income in 1959 of $2,305,676, or $1.70 per share. Net sales were $51,167,804, compared with $58,177,192 for the previous year.

New Jersey Zinc

► First quarter: Net income was $336,613, equal to 17c per share, compared with $1,055,991, or 54c per share, for the first quarter of 1960. Sales amounted to $3,619,319, against $4,873,136 for the same period a year ago.

U. S. Rubber Reclaiming

► First quarter: Net income was $23,371, equal to 5c per share, compared with $148,790, or 33c per share, for the first quarter in 1960. Sales amounted to $1,242,157, against $2,103,455 for the same period in the previous year.

Seiberling Rubber

► First quarter: Net loss of $89,803 compares with a net loss of $16,095 for the first quarter of 1960. Net sales amounted to $11,310,305 against $11,449,674 for the same period a year ago.

Brown Rubber

► For 1960: A net loss of $1,058,028, compares with a net loss of $1,764,474 for 1959. Capital shares outstanding in 1959 and 1960 totaled 378,153.

Anaconda Wire & Cable

► First quarter: A net loss of $215,000 compares with a net income of $320,230, equal to 38c per share, for the first quarter in 1960.

Goodyear

► First quarter: Net income was $15,404,059, equal to 45c a share, compared with $17,025,567, or 50c a share, for the first three months of last year. Net sales amounted to $345,653,781, against $403,416,313 for the like period in 1960.

Columbian Carbon

► First quarter: Net earnings of $1,760,000, or $1.09 per share, compares with $2,109,000, or $1.31 per share, in the first quarter of 1960. Sales totaled $19,944,000, against $20,267,000 for the same period a year ago.

Brunswick

► First quarter: Net income of $2,850,314, or 17c per share, compares with $2,426,315, or 15c per share, for the same period a year ago. Sales came to $52,139,800, against $52,657,900 for the first quarter in 1960.

General Foam

► First quarter: Net income amounted to $62,589, equal to 17c per share, compared with $17,761, or 8c per share, for the comparable period a year ago. Sales totaled $2,674,284, against $1,807,684 for the same period in 1960.

Acme-Hamilton

► For 1960: Net income was $319,663, equal to 9c per share, compared with a net operating loss of $203,736, or 15c per share, for the year before. Sales totaled $17,181,315, against $3,448,981 for 1959.

Cooper Tire

► First quarter: Net income was $10,331, compared with $152,884, for the same period a year ago. Sales amounted to $7,377,117, against $9,063,023 for the first quarter in 1960.

Triangle Conduit & Cable

► First quarter: A net loss of $372,874 was reported, compared with a net income of $353,082, equal to 26c per share, for the same period in 1960.

Nat'l. Rubber Machinery

► First quarter: Net earnings amounted to $86,000, compared with $45,000 for the first quarter of 1960. Sales were $4,237,000, against $6,635,000 in the 1959 period.

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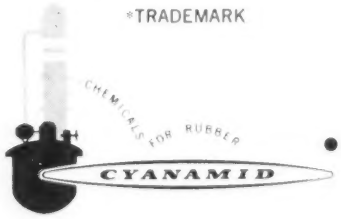


Jefferson Names Two

► Jefferson Chemical Co., Inc., Houston, Texas, has appointed P. R. Monaghan to the newly created post of general sales manager. He will be responsible for the direction of the firm's domestic and foreign sales force, long-range planning, and development of the sales organization. R. E. Werley, assistant sales manager, has been assigned to the company's New York office, where he will be responsible for direction of sales to the major chemical and chemical consuming companies located on the Eastern seaboard.

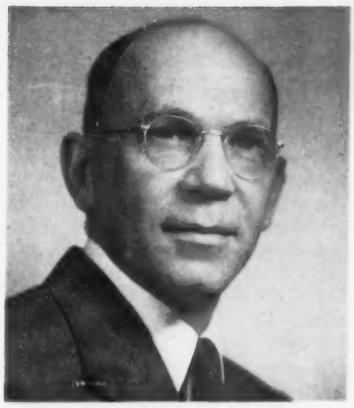
Mr. Monoghan joined the company directly upon graduation from Pennsylvania State University in 1950, after obtaining his B.S. degree in chemical engineering. He has served in several capacities, including manager of the company's Technical Service Division, and has been Eastern Regional Manager since 1957. Mr. Werley, a 1948 graduate of Lehigh University, has been with Jefferson Chemical since 1952, when he joined the company as a salesman for the New England territory. Since then, he has held a number of sales management positions.

Kuzmick Elected

► Raybestos-Manhattan, Inc., Passaic, N. J., has elected Joseph N. Kuzmick, divisional manager of the Manhattan Rubber Division, as vice-president of the company. Mr. Kuzmick joined Manhattan in 1919, and has been active in the development of synthetic resins, plastic products, brake linings, and other industrial products. He served as coordinator of corporation research and development activities before being appointed divisional manager of the Manhattan Rubber Division in 1959. He was elected a director of the company in 1960.

Exon Resin Unit Enlarged

► Firestone Plastics Co., Pottstown, Penna., has started production at its recently enlarged Exon vinyl resins plant. The expansion program included the enlarging of the reactor building, installation of 12 additional reactors, construction of a new substation, pump house and cooling tower. The company states that these new facilities will enable the plant to increase its production capacity for resins and paint latices approximately 20 per cent.



N. E. Ries

Retires from Mohawk

► Nile E. Ries, factory manager for the Mohawk Rubber Co., Akron, Ohio, has retired after thirty-seven years of service with the company. Mr. Ries joined Mohawk in 1924 as factory superintendent, and in 1944 was promoted to factory manager in charge of all manufacturing operations. He has been active in union negotiations with the International Rubber Workers of America, and is credited with being largely responsible for the firm's successful record of employee relations. He has been a member of the Mohawk board of directors since 1952.

Firestone Names Perry

► Firestone Rubber & Latex Products Co., Fall River, Mass., has placed Russell W. Perry in charge of research and development of urethane elastomers. Mr. Perry was graduated from Baldwin-Wallace College in 1948 with a B.S. degree in chemistry. He has been a research chemist with the Firestone Tire & Rubber Co. for nearly 13 years working primarily on the polymerization of fibers and plastics. Mr Perry is a member of the American Chemical Society.

Bureau Publishes Papers

► The Technical Service Division of the Natural Rubber Bureau, 1108 16th St., N.W., Washington 6, D.C., has published a 108-page booklet containing 10 of the 65 papers delivered at the 1960 Natural Rubber Research Conference, held in September, 1960, at Kuala Lumpur, Malaya. The booklet is available, without charge, to technologists in the industry.

New G-E Silicone Rubber

► The Silicone Products Department of the General Electric Co., Waterford, N. Y., has introduced a new silicone rubber compound for use as wire and cable insulation. The new material, called SE-9007, is designed primarily for high quality aircraft, hook-up, motor lead and similar wire applications. It is said to offer excellent processing characteristics, easy milling, high extrusion speed, and good diameter control. Typical physical properties as extruded on wire are: tensile strength, 1200 psi; elongation, 425 per cent. Electrical properties obtained at 77°F. and 50 per cent R. H. on 6 x 6 x .040-inch sheets, oven cured 24 hours at 480°F., after immersion in water for 29 days at 158°F. are: volume resistivity, 5 x 10^{15} ohm-cm; electric strength, 650 vpm; dielectric constant, 3.2 (60 cps); power factor, .001 (60 cps).

Chase-Gro-Cord Formed

► Gro-Cord Rubber Co., Lima, Ohio, has announced plans for the joint financing of a new manufacturing corporation, to be known as Chase-Gro-Cord, Inc., which will erect a plant in El Dorado, Arkansas, for the production of Gro-Cord Rubber's present product lines. The new company will acquire some of the assets of Gro-Cord Rubber Co. and some of the assets of the Quincy, Mass. plant, of Chase & Sons, Inc. The cost of the new plant and equipment will be about $2,000,000. Gro-Cord reports that it will discontinue its manufacturing operations in Lima, Ohio, during the next year, because of the lack of suitable space for expansion and the "unavailability of needed long-term financing."

Flexzone 3-C Produced

► Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn., has gone into large-scale production of Flexzone 3-C, quadrupling its capacity to produce the chemical that minimizes cracking in tire sidewalls and treads. The anti-ozonant-antioxidant has been used primarily in truck and other heavy-duty tires. Compounded into the tread rubber, it is claimed that the chemical has increased their resistance to cracking by more than 400 per cent. It is expected that this increased capacity will make Flexzone 3-C available to the passenger car tire-making industry.

West Coast News

► A dinner and technical meeting were held by the Los Angeles Rubber Group, Inc., on May 2 at the Biltmore Hotel, Los Angeles, Calif. The dinner was sponsored by the Goodyear Tire & Rubber Co., and featured Joseph A. Walker, chief test pilot for the National Aeronautics and Space Administration, as the guest speaker. Mr. Walker addressed the group on the subject "Rocket Pilot." Bradford R. Voight, assistant manager of the Process Engineering Division of the Farrel-Birmingham Co., Inc., Ansonia, Conn., addressed the technical meeting on the topic "Automation of Rubber and Plastic Processes."

Mr. Voight pointed out that automation in the processing operations in the rubber and plastics industry represents a constantly growing trend today. Ever-increasing demands for these materials, higher costs, and narrower profit margins have created a climate which demands greater productivity from every member. The speaker went on to outline the benefits resulting from automation, and to discuss several pertinent applications and analyze equipment requirements relative to production goals and sales. Mr. Voight concluded his talk with a consideration of the technological implications of a proposed automation project in relation to production, marketing and the financial aspects.

► Lee Rubber & Tire Corp. has opened two factory branches, with wholesale and retail sales facilities, in Portland, Ore. and Seattle, Wash. The company states that it is expanding its sales and service facilities to meet increased demand for its products in these areas. The new branches will be fully stocked with a complete line of Lee products. Earl H. Crismon has been appointed manager of the Portland branch, and William R. Arkell has been named branch manager of the Seattle operation.

► United Carbon Co., Inc. has moved its Pacific Coast district sales office to 630 West Duarte Road, Arcadia, Calif. The new telephone number is MUrray 1-1016.

► More than 40 students from the 7th, 8th, and 9th grades, and educators were delegates to the second annual Firestone Youth & Science Day observance at the Firestone Tire & Rubber Co. plant in South Gate, Calif. The program began in Firestone's Guided Missile Division with a demonstration in which students were able to talk over a beam of light. Other highlights of the morning program included a tour of the tire plant, a talk by auto racing champion Peter DePaolo on "The Science of Keeping Safe on the Highways," and a movie, "A Changing Liberia," showing how science helps people of other nations. Leonard K. Firestone, president of Firestone Tire & Rubber Co. of California, greeted the delegates after lunch. The tour concluded with an address by Don Muchmore, director of the California Museum of Science and Industry, who spoke to the assembled students, educators, and Firestone staff members on "What *You* Can Do for Science."

► Arrowhead Products Division of Federal-Mogul-Bower Bearings, Inc. has begun construction of a $1 million engineering and research facility at Los Alamitos, Calif. The plant will specialize in such product areas as rubber and plastics, metal products insulation, prototype fabrication and testing, and human factors engineering for the aero-space industries. The building will have a working area of 114,000 square feet, including auxiliary storage of 4,000 square feet. Manufacturing and service areas will occupy 66,000 square feet, research and laboratory facilities, 36,000 square feet, and offices, 12,000 square feet. The individual laboratories will have a special system to control humidity and temperature, and to duplicate all types of environmental conditions. The building is expected to be completed in September.

► Two new catalysts for high temperature polymerization of various monomers and copolymers have been developed by U. S. Peroxygen Corp., Richmond, Calif. They are 2,5-dimethyl hexyl-2,5-diperbenzoate (USP 711) and 2,5-dimethyl hexyl-2,5-diperacetate (USP 811).

J. M. Collier

Named by Goodrich-Gulf

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has appointed John M. Collier as a sales representative on the West Coast with headquarters at Garden Grove, Calif. Mr. Collier received his M.A. degree in organic chemistry from the University of New Mexico. Upon his graduation in 1958, he joined Goodrich-Gulf at the Institute, West Va., plant, and has served in the sales service laboratories up to the time of his present appointment.

► The Aviation Products Division of the B. F. Goodrich Co., Rialto, Calif., has developed a solid fuel made with synthetic rubber which reportedly will reduce the weight of rockets and increase their energy output. The fuel, a mixture of Hycar rubber and high energy compounds, was developed at the Goodrich rocket motor plant in Rialto. It is said to be more dense than previously developed propellants, with 6 per cent more energy than present rubber-based fuels. The company reports that the high energy fuel, in the Nitro C rubber group, will have important applications in anti-aircraft missiles, the upper stages of ballistic missiles, and high-mass-ratio motors for space probe and satellite missions.

► Twenty-eight outstanding high school seniors throughout the United States have won full-tuition college scholarships under the 1961 Scholarship Awards Program of the Firestone Tire & Rubber Co., Akron, Ohio.

P. W. Libby

Named by Huber

► J. M. Huber Corp., New York, N. Y., has appointed Paul W. Libby as technical service manager of the Industrial Products Department at Borger, Texas. He succeeds Clinton A. Carlton, who has retired after 25 years of service with the company. Mr. Libby joined the company in 1951, and later served as supervisor of rubber industry sales in the middle and far west. In 1954, he was named manager of the Development Department in Borger in charge of technical service for rubber industry customers in the western section of the United States.

Ohio Rubber Unit Opens

► Ohio Rubber Co. has begun manufacturing operations at its new $3,500,000 facility in Fort Smith, Ark. The 190,000 square foot plant will produce molded precision rubber parts for oil field, automotive, and general industry, and semi-pneumatic tires for industrial, agricultural implement, juvenile wheel goods, and other applications. The company reports that the plant, its fifth manufacturing facility, also will provide its customers with technical assistance and product research and development.

Named by General Latex

► John E. Hobbs, general manager of the General Latex and Chemical Corp. of North Carolina, Charlotte, N. C., has been elected vice-president of the firm. He will continue his duties as general manager. Mr. Hobbs is a graduate of the University of North Carolina. Before being appointed general manager of the Charlotte plant, he served as a sales representative for General Latex and Chemical Corp. of Georgia.

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Canadian News

► According to C. E. Joslin, president of the Rubber Association of Canada, automotive products account for at least two-thirds of the total value of factory shipments by the Canadian rubber industry. In 1959, factory shipments of tires and tubes alone were valued at $182,806,000, or 53 per cent of the total value of all rubber industry shipments. In comparison, shipments of footwear were valued at $32,031,000, or 9 per cent of the total, and shipments of all other products amounted to $132,843,000, or 38 per cent of the total.

Volume of production in the Canadian rubber industry as a whole has shown a marked upward trend over the past decade, Mr. Joslin pointed out, despite a drop in rubber consumption in 1960. Probably the best measure of the volume of production in the industry, he declared, is consumption of new rubber (natural and synthetic). By this measure, the rubber industry's volume of production rose by some 80 per cent between 1949, when consumption amounted to 56,368 long tons, and 1959, when consumption amounted to a record 101,475 tons.

In 1960, consumption fell to 91,035 tons, and the Rubber Association of Canada forecasts that consumption in 1961 will remain at about this level. Mr. Joslin expressed confidence, however, that this is a temporary set-back, and that the rubber industry will resume its growth as soon as the Canadian economy recovers from the recession of the past year or so.

► G. F. Plummer, executive vice-president of Dunlop Canada, Ltd., Toronto, Ontario, has come up with several interesting predictions concerning developments in the tire industry. According to Mr. Plummer, a one-piece automobile wheel, with a rubber wheel and tire in one unit, is a future possibility. Other forecasts include: a new two-ply tire, heavier and stronger than present two-plies, which will be in use next year and which may be adopted as original equipment by auto manufacturers; a one-ply tire, made from a single calendered cord wound continuously on the diameter of a special drum; a tire of plastic or other material, molded without plies, which will be developed within ten years; reduction in the number of plies used in truck tires; elimination of dual wheels, and changing of wheel sizes, so that trucks will ride lower to the ground and thus be able to carry larger quantities of lighter weight loads. The Dunlop executive also predicted that the number of cars and tires sold probably will double in the next decade.

► The sharp rise in the sales of urethane foam in the last two years is reported to be a factor in the decision of Dunlop Canada, Ltd., and Goodyear Tire & Rubber Co. of Canada to drop out of the foam rubber field. The competitive new material is said to float like cork, weigh as little as feathers, insulate against heat, cold and noise, and offer comfortable cushioning for the human frame and an attractive appearance. Some 80 per cent of the output of the plastic foam in Canada is used in upholstery for use in homes and automobiles, where it goes into cushioning, seat-covers, topper pads, arm rests and crash pads. In the new "foamed in place" techniques, liquid urethane is injected into boat sections to give buoyancy, into refrigerators for insulation, into molded packaging for crash protection. The liquid quickly solidifies into its customary multicellular form, filling the entire mold cavity.

► Seiberling Rubber Co. of Canada Ltd., Toronto, Ontario, has developed a tire, trademarked Nytex, which combines nylon and rayon fabric in its construction. The combination of the two competing tire cord materials in one tire is said to offer the advantages of both — strength provided by nylon, and riding comfort and reduced vibration provided by rayon. The new tire is constructed with the two nylon plies on the inside, where greatest impact resistance is needed, and the rayon plies on the outside, under the tread. The company claims that this combination eliminates the flat-spotting characteristic of nylon tires, which produces a temporary "out-of-round" condition causing tire thump.

► Polymer Corp., Sarnia, Ontario, is producing synthetic rubber at the highest rate in its history — approximately 150,000 to 155,000 tons per year. The company anticipates operating at peak levels through the remainder of the year. A market breakdown reveals that Canada is continuing to produce 3 per cent of the world total output; the United States, 5 per cent; and the other largest producers, 65 per cent. This means that the Canadian producer has more than tripled production in the last decade. The company claims that it is spending as much on synthetic rubber research as the major United States rubber companies, in order to hold its position in the world rubber picture.

Polymer has also announced the award of a contract to the Badger Manufacturing Co., Cambridge, Mass., to construct its $12 million specialty rubber plant at Strasbourg, France. The American firm received the contract, despite strong protests from many Canadian engineers, because of its experience with synthetic rubber installations, and experience in Western Europe. According to Canadian government officials, the combination of experience and European contracts could not be found among Canadian firms.

► Canada's four major rubber companies — Dominion Rubber Co., Kitchener, Ontario, Dunlop Canada Ltd., Toronto, Ontario, Goodyear Tire & Rubber Co. of Canada Ltd., Toronto, Ontario, and Firestone Tire & Rubber Co. of Canada Ltd., Hamilton, Ontario — are each marketing giant collapsible rubber tanks capable of storing up to 200,000 gallons of liquid. At present, none of the rubber tanks are being made in Canada. Dunlop is producing the tanks in the United Kingdom, and the other firms obtain them from the United States.

► Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ontario, has announced three changes in its sales staff. W. E. Ecclestone, formerly manager of the Tire Sales Division, has been appointed general sales manager for the company. G. F. Turner, previously manager of the Tire Marketing Division, has been named manager of the Tire Sales Division, succeeding Mr. Ecclestone. D. W. Moriarty, formerly manager of the Western Quebec Division, has been named assistant manager of the Tire Sales Division.

New Butyl Rubber

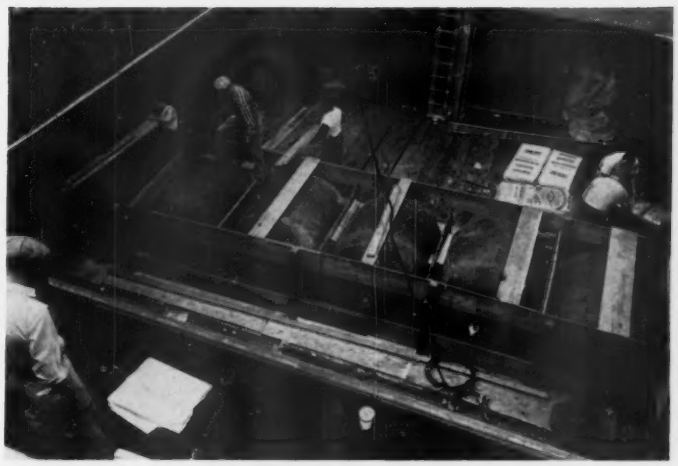
► Esso Research and Engineering Co., Linden, N. J., has developed a new type of butyl synthetic rubber, believed to be applicable in advanced construction designs and other applications requiring low-cost, long-lasting characteristics. It is particularly recommended in curtain walls, utilizing metal frameworks from which panels are hung to form walls. The new rubber forms a weatherproof skin around the building, acting as a sealing system along the edges of the glass and panels. An important feature of the rubber is its ozone resistance, said to be greater than that of other commercial general purpose rubbers. Other applications include automotive weather stripping and seals, electrical insulation, extruded and molded sponge, and other molded goods, such as hose and tubing.

Bateman Addresses ACS

► Dr. Leslie Bateman, director of the Natural Rubber Producers' Research Association, London, England, addressed a meeting of the American Chemical Society, held on May 15 in San Francisco, Calif., on the topic "Nature Plus Science — Some New Vistas before the Natural Rubber Industry." Dr. Bateman traced the pattern of the Malayan natural rubber industry's research effort, and outlined the competitive position of natural rubber versus synthetic. The speaker placed particular emphasis on a new research program that is delving into how the rubber tree produces its products. Dr. Bateman declared that recent discoveries may have tremendous technical and economic potential for the natural rubber industry.

Mobay Raises TDI Output

► Mobay Chemical Co., Pittsburgh, Penna., has completed an expansion of its tolylene diisocyanate (TDI) facilities that will increase production from 25 to 40 million pounds annually. At the same time, the company has approved plans for construction of an additional 10-million-pound facility, at a cost of $1.5 million, bringing its TDI capacity to 50 million pounds by this Fall. The projected increase will be Mobay's fifth major expansion since its original 10 - million - pound TDI plant went on stream in 1956 at New Martinsville, W. Va.



Latex Shipped in Rubber Drums

► Ten tons of rubber are uncrated at a Jersey City, N. J., pier, in an experimental shipment of latex in rubber drums. United States Rubber Co., New York, N. Y., developer of collapsible containers called Sealdrums, made the test shipments from its plantations in Malaya. Each Sealdrum holds 500 gallons of latex. Ordinarily, latex is shipped in disposable steel drums, or in 150,000 gallon tanks found only on special equipment vessels. These rubber drums would permit more flexible shipment schedules, because they could be shipped on almost any type of vessel making a call at Penang, Malaya. The drums can be easily cleaned, and prevent contamination of the air-sensitive latex. The filled containers are stored in the ship's hold like giant eggs in a carton. When emptied, they occupy little storage space.

Named by Burton Rubber

► Burton Rubber Processing Inc., Burton, Ohio, has announced three appointments to its technical staff. F. M. Daugherty has been named chief chemist, Kevin Brown has been appointed assistant chief chemist, and J. B. Coffey has been appointed purchasing agent. Mr. Daugherty, a graduate of John Carroll University, had served in the industrial products compound development group of the Goodyear Tire & Rubber Co. For the past four years, he has been associated with the R.C.A. Rubber Co., Eclat Rubber Co., and the Pulaski Rubber Co.

Mr. Brown attended the University of Notre Dame and Case School of Technology. He had worked in the Rubber Laboratory Division of the Lubrizol Co., and for the past three years has been with Burton Rubber as purchasing agent. Mr. Coffey is a graduate of La Salle University. He has been associated with the Gro-Cord Rubber Co. since 1944 in various managerial functions, including purchasing agent.

Price-Cutting Charged

► General Cable Corp., New York, N. Y., has filed a complaint with the U. S. Treasury Department regarding alleged cut-rate pricing of insulated telephone cable sold in the United States by three Canadian firms. The complaint charged the Canadian companies with violation of the U. S. anti-dumping law. The three concerns involved in the complaint are Northern Electric Co., Phillips Electrical Co., Ltd., and Canada Wire & Cable Co., Ltd. They are being charged with selling telephone cable in this country at prices ranging from 28 to 38 per cent below the Canadian price.

The Treasury has announced that it will begin a preliminary investigation to see whether the accusation is true. Under machinery set up by the anti-dumping law, higher duties can be imposed on imported products if cut-rate pricing is shown to be harmful to American producers. While the Treasury receives many complaints under the law, actual impositions of higher duties are rare.

Obituaries

Lewis G. Fairbank

► Lewis G. Fairbank, retired general manager for the Firestone Tire & Rubber Co., Akron, Ohio, died on May 7 after a fall from his eighth-floor apartment in Lakewood, Ohio. He was 75 years old. Mr. Fairbank joined Firestone in 1913 as assistant advertising manager. Five years later, he was named vice-president and general manager of Firestone Steel Products. He returned to the parent company in 1920, and served successively as manager of manufacturer's sales, manager of truck and bus tire sales, and manager of pneumatic tire sales. He was named general manager in 1942, the post he held until his retirement in 1955. Mr. Fairbank leaves his widow.

Herbert T. Dyett

► Herbert T. Dyett, former president and chairman of the Rome Cable Corp., Rome, N. Y., died at his home on May 8 at the age of 86. Mr. Dyett graduated from Cornell University in 1897. In 1902, he founded the Rome Wire Co., one of the companies that were combined to form the General Cable Corp. in 1927. He resigned as president of General Cable in 1933, and three years later became a founder and president of Rome Cable Corp. He served as chairman from 1944 to 1959, when he retired. He continued to serve as a director of the Rome Cable Division of the Aluminum Co. of America. Mr. Dyett's survivors are his widow, a daughter and a son.

Gordon Murphy

► Gordon Murphy, vice-president of Foote Bros. Gear & Machine Corp., Chicago, Ill., and of its subsidiary, the Whitney Chain Co., Hartford, Conn., died suddenly on April 26 at his home in Hinsdale, Ill. He was 49 years old. Mr. Murphy graduated from the U. S. Naval Academy in Annapolis, and served as a submarine officer during World War II. He was previously associated with Fairbanks Morse & Co., and had been with Foote Bros. for the past 14 years. Mr. Murphy's survivors are his widow and three brothers.

Elias M. Salzberg

► Elias M. Salzberg, former dealer in crude rubber, died on March 14 in a Miami Beach, Fla., hospital. He was 70 years old. Mr. Salzberg's first position was with the firm of Meyer & Brown Corp., rubber importers. He was 15 years old at the time. He was sent to Boston, Mass., as a sales representative, and in 1921 went to Akron, Ohio, as manager of the branch office there. He rose to secretary of the firm but left later on to form his own firm, E. M. Salzberg, Inc. Mr. Salzberg leaves his widow and a daughter.

Del Driesbaugh

► Del Driesbaugh, sales engineer at the Plastic and Rubber Products Co., Los Angeles, Calif., died on April 17 of a heart attack. Mr. Driesbaugh joined the company in 1953 as district manager for the San Francisco Bay Area. While serving in this capacity, he suffered his first serious attack. He returned to Plastic and Rubber Products in 1958 as sales engineer in the Los Angeles area, the position he held up to the time of his death. Mr. Driesbaugh leaves his widow, two sons, and a daughter.

Robert T. Haslam

► Robert T. Haslam, retired vice-president of the Standard Oil Co. of New Jersey, died on April 4 at Sarasota, Fla. He was 73 years old. Mr. Haslam graduated from the Massachusetts Institute of Technology in 1911 with a B.S. degree in chemical engineering, and served on the MIT faculty and with the National Carbon Co. prior to joining Standard Oil and its affiliates in 1927. He was active in the early developments of butyl rubber. Mr. Haslam's survivors are his widow and a son.

Charles P. Knight

► Charles P. Knight, treasurer of the Okonite Co., Passaic, N. J., died of a heart attack on May 24. He was 57 years old. A graduate of St. Lawrence University, he began his business career in 1928 with Price, Waterhouse & Co. In 1946, he joined Okonite as assistant treasurer, and was named treasurer in 1949. His survivors are his wife and son.

Kaiser Denies Charge

► An antitrust suit, filed in Federal district court at Providence, R. I., by the Department of Justice, against Kaiser Aluminum and Chemical Corp., Oakland, Calif., has brought a denial from the company that its 1957 acquisition of the U. S. Rubber Co. plant at Bristol, R. I., violated the Clayton Antitrust Act. The Kaiser statement said that prior to 1957 it had produced bare and covered aluminum conductors, but had not participated in the insulated conductor field. The statement pointed out that Kaiser purchased the Bristol plant "principally to encourage the general conversion in the insulated conductor industry from copper to aluminum." The company expressed the belief that this acquisition tended to increase competition and to broaden and increase the use of aluminum.

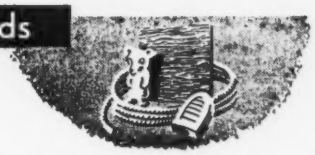
New Goodyear Resin

► A new vinyl chloride resin tailored for heavy gauge sheeting and called Pliovic BL-80 has been developed by the Goodyear Tire and Rubber Co., Akron, Ohio. The new material is described as a cold blending or "blotter" type resin. It can be preblended at room temperature and will absorb high amounts of plasticizers to form a relatively dry, free-flowing mixture without heating, acording to the company. Because of its high absorption characteristics the new resin can also be used in highly plasticized formulations required for soft jacket or outerwear material and upholstery sheeting, it is said. The new vinyl also is reported to show improved calendering properties and to produce smoother banks and better release over a wide range of temperatures and conditions.

Firestone Tread Blend

► An expanded line of tread rubbers has been developed by the Firestone Tire & Rubber Co., Akron, Ohio, as the result of a liquid mixing process involving the blending of ultra-fine carbon black with rubber. According to Firestone, the use of the finest carbon black available has led to a lighter weight tread rubber which gives longer wear and more mileage. Called Micro Blend, the tread rubbers are available in 10 different blends for passenger tires, five for truck tires, and three each for farm and other off-the-highway, aircraft, and racing tires.

New Goods



Rubber Insulating Blanket

► A specially compounded, precision molded, natural rubber insulating blanket for protection of utility linemen and others working with high

voltage, is being offered by Charleston Rubber Co., Stark Industrial Park, Charleston, South Carolina, under the catalog designation CB-36. The protective blanket measures 36 x 36 inches, and has mold-formed eyelets. It is designed to resist aging and rough handling and, in addition, has high dielectric strength, handles easily on lines, and is easily draped.

Stoner Pressure Bags

► Re-usable, heat-resistant silicone modified rubber and butyl rubber bags are being produced by the Stoner Rubber Co., Inc., 10792 Knott Ave., Anaheim, Calif. According to the manufacturer, the bags can be built to close tolerances and in intricate contours and shapes, and sizes to meet the exacting demands of the missile and plastics industries. With proper care and handling, the bags are said to be re-usable up to 50 times at temperatures up to 350°F. One advantage claimed for the silicone modified rubber bag is the ease with which a patch can be applied.

Goodrich Koroseal Matting

► A Koroseal vinyl matting designed to reflect light in two directions, said to give an illusion of depth, has been introduced by the B. F. Goodrich Industrial Products Co., Akron 18, Ohio. According to the company, the depth illusion is caused by alternating light reflections from the small chevron pattern featured in the design. The matting is 3/32-inch thick, and is available in white and green colors.

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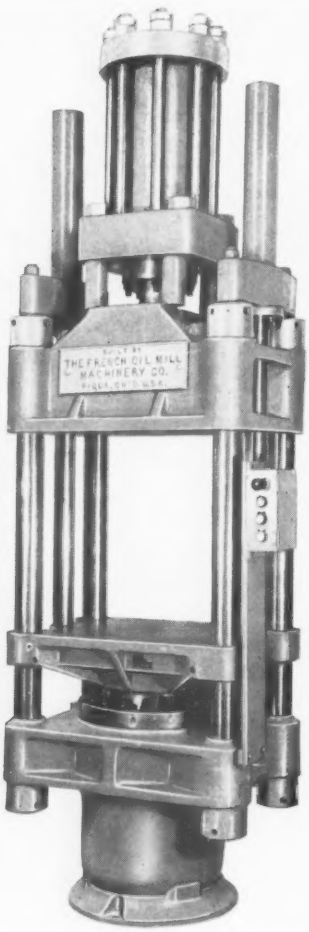

#5502—154-ton press; ram diameter, 14"; working pressure, 2000 P.S.I.; pressing surface, 24" x 24"—transfer

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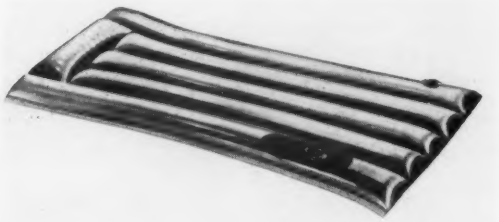
Fabrico Floating Mattress

► A floating mattress with a built-in pillow, designed for beach, lakeside, or pool use, is available from Fabrico Manufacturing Corp., 1718 W. Division St., Chicago, Ill. The air mattress is



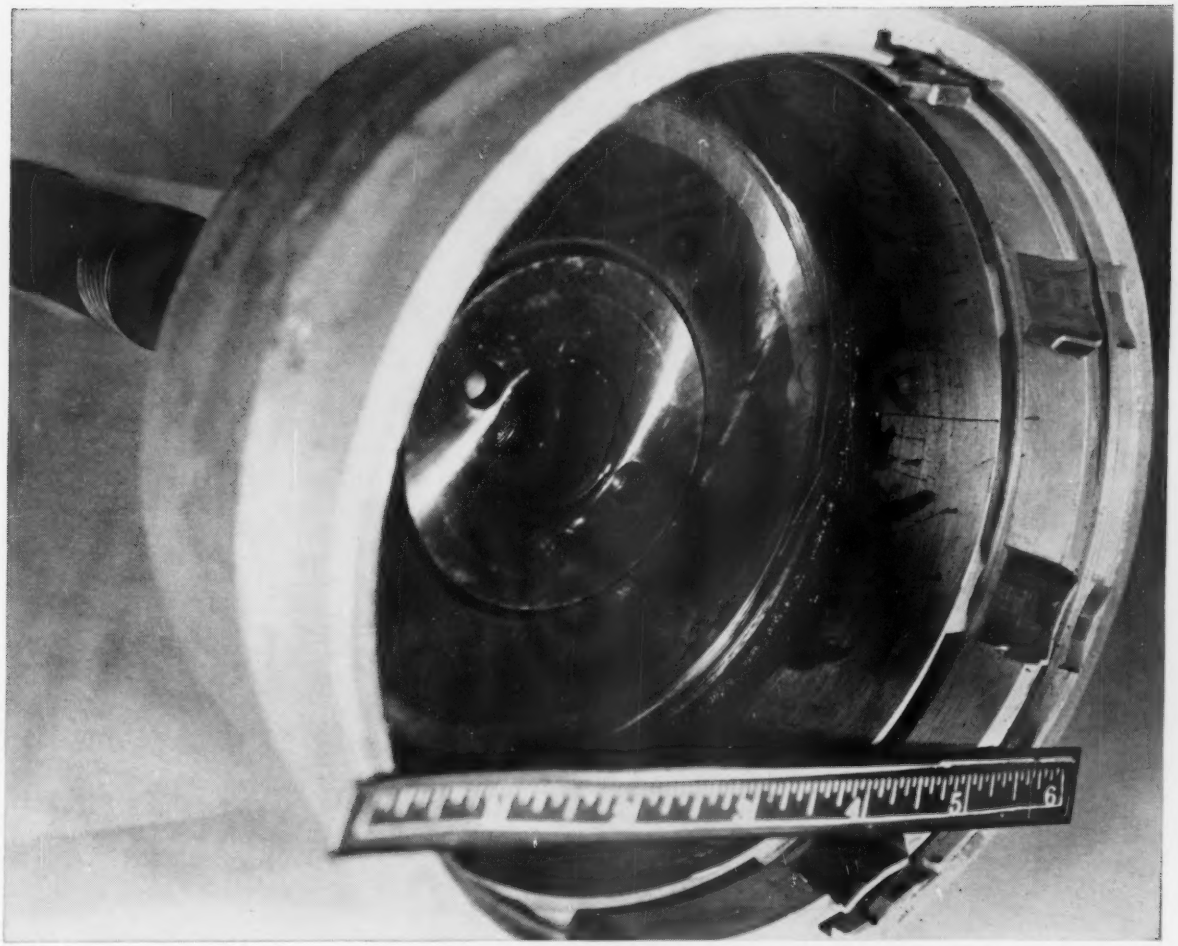
made of Krene vinyl, and has a self-contained polyethylene bellows said to be so easy to operate that a child can pump it with ease. An oversize, leak-proof valve makes the mattress easy to deflate as well. Reported to be resistant to abrasion or snags, the mattress-pillow-pump is available in two sizes: 72 x 28 inches, and 76 x 30½ inches.

Goodyear Colored Insulation

► Three new decorative colors in Vinylfilm insulation facing are being offered as standard items by Goodyear Tire & Rubber Co., Akron, Ohio. For the first time, the line will include Vinylfilm in mint green, medium blue, and white, plus the original silver metallic, as standard colors. Developed for use in facing all types of glass fiber and mineral wool insulation, the color-decorated product is available in standard widths ranging from 38 to 54 inches. Gauges offered are .002, .004, and .006, with a large selection of widths in .004 gauge available from inventory. According to Goodyear, the Vinylfilm provides an economical moisture-vapor barrier especially formulated to insure the flame retardant characteristics considered advantageous in the building trades.

U. S. Rubber Expansion Joint

► A new rubber expansion joint, developed by U. S. Rubber Co., 1230 Avenue of the Americas, New York, N. Y., has an inner construction that enables the metal re-enforcing rings to remain stable under pressure. Called the AMR (anti-migration rubber) expansion joint, it is said to provide the same flexibility, but 60 per cent more capacity for withstanding high working pressures than standard joints. The new construction is designed to meet the demand for power and processing systems that require piping capable of withstanding flow surges and high pressure. The AMR joint can also handle corrosive materials and withstand a wide range of temperatures.



CYCLEWELD CHEMICAL PRODUCTS DIVISION, CHRYSLER CORPORATION

SEE WHAT RUBBER-BASE ADHESIVE CAN DO?

This is the housing of an automotive torque converter. It's joined to the output shaft by a thin film of thermoset cement.

The converter has just undergone torsional tests that wrecked its mechanical parts—with no effect whatever on the metal-to-metal bond. This bonding job is an achievement of Cycleweld Chemical Products Division of Chrysler Corporation.

A similar cement, made of nitrile rubber and Durez® phenolic resin, cut the cost of assembling an all-aluminum truck tailgate from $15.18 to $1.75 by eliminating 211 rivets and 42 welds.

Other heat-setting cements that marry rubber and phenolic resin show promise for:

- building new strength and quietness into car doors, deck lids, and hoods by edge-bonding instead of tack welding.
- attaching metal trim without drilling holes.
- easy-to-cast aluminum engine heads and intake manifolds, made in *two* sections bonded together with a leakproof, heatproof seal.

If you have a tougher-than-usual bonding problem—or expect to have one—now's the time to see what a rubber-phenolic adhesive can do for you. We'll be glad to put you in touch with people who make such adhesives.

We don't make these adhesives. We just supply some of the basic ingredients—phenolic resins that influence the qualities a good structural adhesive must have. Permanent, rigid set. Controlled tack. Heat resistance. Precise sameness from batch to batch. Good storage stability. Many superstrong adhesives are the result of teamwork between rubber chemists and Durez resin chemists backed by 40 years of experience.

DUREZ PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION, 106 WALCK RD., NORTH TONAWANDA, N. Y.

HOOKER CHEMICALS PLASTICS

Most rubber considered the "industry's best" 4 years ago would not be acceptable today

AND THIS MAN KNOWS WHY!

He's Production Manager DONALD T. NORWOOD . . . and he knows that during these past four years Copolymer has set the pace in the control of product uniformity in the synthetic rubber industry.

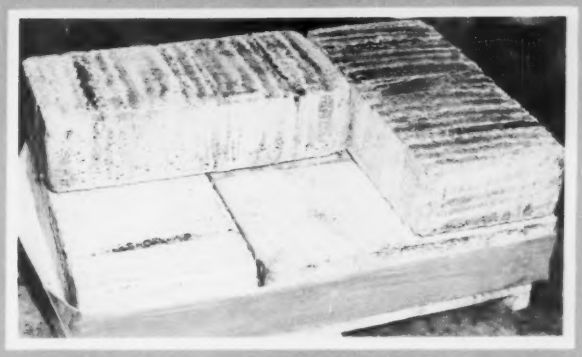
He knows that Copolymer's automation of production facilities provides precise control of component quality throughout *all* phases of the manufacturing process—consistently assuring products of superior performance.

A graduate mechanical engineer with years of training and experience, DON has earned an enviable record of performance as Production Manager by keeping a "weather eye" on the quality of materials that flow along the production line to insure the best quality of the finished product.

He's part of the leadership and pioneering for which Copolymer is noted. He's a key member of the Copolymer "action management" team.

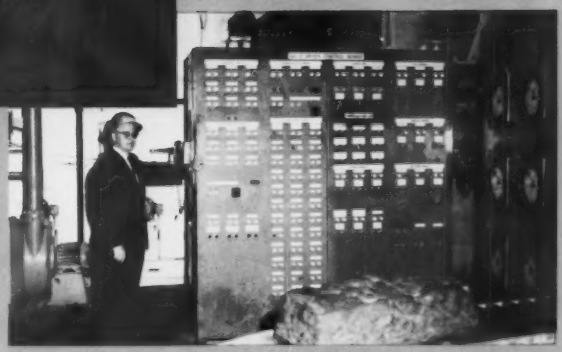
Some of the best rubber in the industry was produced at Copolymer four years ago. Yet, improvements have been so vast, that most of those compounds would not be acceptable by Copolymer standards today!

THESE REJECTED BALES ARE ONE EXAMPLE.



These are bales of black masterbatch that Copolymer customers never see. Their moisture content is in excess of the Copolymer standard, YET STILL WITHIN INDUSTRY TOLERANCE.

Copolymer's production department utilizes a method to inspect EACH BALE INDIVIDUALLY for moisture content. This allows Copolymer to achieve a degree of control which is impossible through ordinary laboratory controls which consider only portions of a given production run.



Automation of production facilities during the last several years has meant automatic control of materials metered into the manufacturing process —and greater control of finished product quality. The precise, efficient operation of Copolymer's production facilities is the responsibility of Production Manager Don Norwood.

UNIFORMITY is the result of extremely close control of all components which go into Copolymer products, the broad understanding of operational variables, solution make-up, coagulation and drying conditions.

Copolymer

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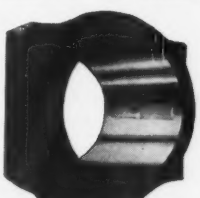
Plastisol-Coated Wire Baskets

► A self-stacking, plastisol-coated wire basket system, developed by Abbey Wire Works, Inc., Collins and Westmoreland Streets, Philadelphia, Penna., is said to cut time and labor costs in many general manufacturing and distributing operations. Used adjacent to assembly lines, the baskets can be loaded with finished products, stacked on dollies, and transported to shipping areas or to storage areas. Whether the baskets are going to be exposed to refrigerated conditions, or to extended outdoor use, the dangers of rust and corrosion reportedly have been eliminated, thanks to the non-toxic, plastisol protective coating. Plastisol bonds and adheres to the wire, making it difficult to strip or damage. In addition, the coating is resistant to moisture, according to the manufacturer, and is superior to ordinary chrome or zinc plated finishes which pit, flake off, and leave the bare wire exposed. Plastisol also withstands oil, grease, and many chemicals.

Curon Foam Insulation

► Curon foam, laminated with 15-gauge vinyl sheeting, has been introduced as a thermal insulation material by Reeves Brothers, Inc., 1071 Avenue of the Americas, New York 18, N. Y. Supplied in 4 x 12 foot sheets, one inch thick, Curon foam insulation is said to be intended primarily for outdoor and indoor use on chemical and oil storage tanks and processing equipment. It is recommended by the manufacturer for surface temperatures ranging from 50° to 250°F. According to Reeves, the vinyl sheeting provides the foam with a completely weather resistant surface that can easily be cleaned. In application, commercial mastic cement is used on the surface to be insulated and the Curon foam sheets, each weighing 12½ pounds, are applied by hand pressure. The manufacturer states that the material is resilient and withstands impact, abrasion and vibration.

HEAVY RUBBER & PLASTIC MACHINERY



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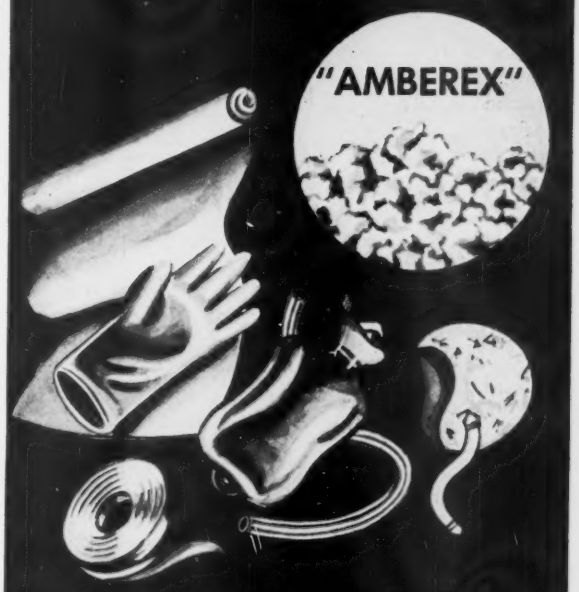

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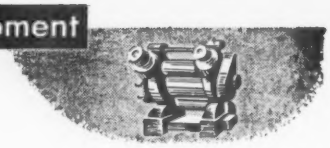
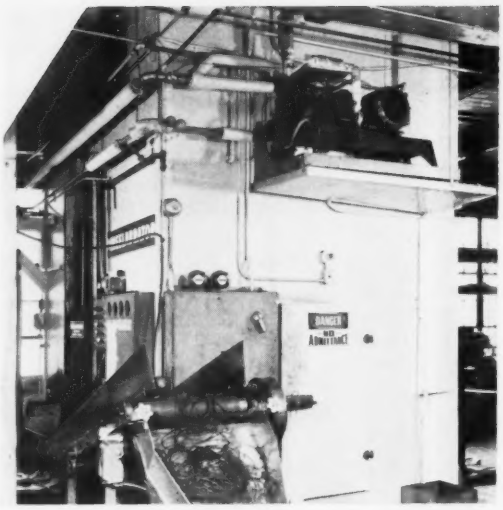
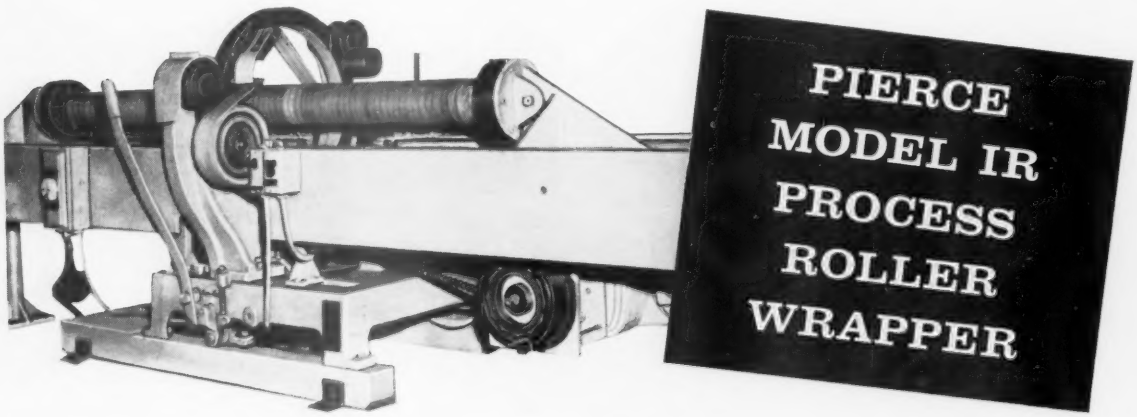


Wheelabrator Deflasher

►The Impact Mechancial Deflashing Process, developed by the Wheelabrator Corp., Mishawaka, Ind., is designed to remove flash from precision rubber molded parts with controlled flash that does not exceed .005" at the point where it is attached to the part. The manufacturer states that Mechanical Impact Deflashing is not limited to a single part or sheet of parts such as the die trimming methods, or to a narrow range of parts such as with CO_2 or dry ice tumbling, and completely eliminates the hand labor of buffing, tearing, knife or scissors cutting. The process is also capable of deflashing parts with very thin sections, so long as flash thickness is .005" or less and the part wall thickness is at least .015" or thicker. The process consists of introducing molded rubber parts into a 2-cubic foot work chamber of a Wheelabrator deflashing machine that is enclosed within an insulated cabinet. While in this chamber, liquid CO_2 is sprayed through nozzles to freeze the flash on the parts, not the parts themselves. Then, media particles are hurled by centrifugal force against the parts, fracturing and removing the frozen flash without damage to the soft unfrozen part. The complete unit comprises a deflashing machine and a dust collector, the latter being used for ventilating the operation and for removing impurities from the media supply. Both units are completely contained within a fully insulated enclosure equipped with an auxiliary refrigeration unit.





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The Goodman Model 6-24 Cutter is a rugged, accurate unit for producing large slugs (up to 6" dia.) from uncured rubber. In a normal installation, material leaves the extruder, passes through a cooling trough, and enters the Cutter directly, eliminating handling of stock. Simple, easy-to-reach controls vary speed of cutter head and feed rolls, and feeding pressure between rolls. Cutting blades (4 furnished) are hardened steel. A pump wets down material at the cutting point. A built-in conveyor delivers stock to any receptacle or other conveyor desired.

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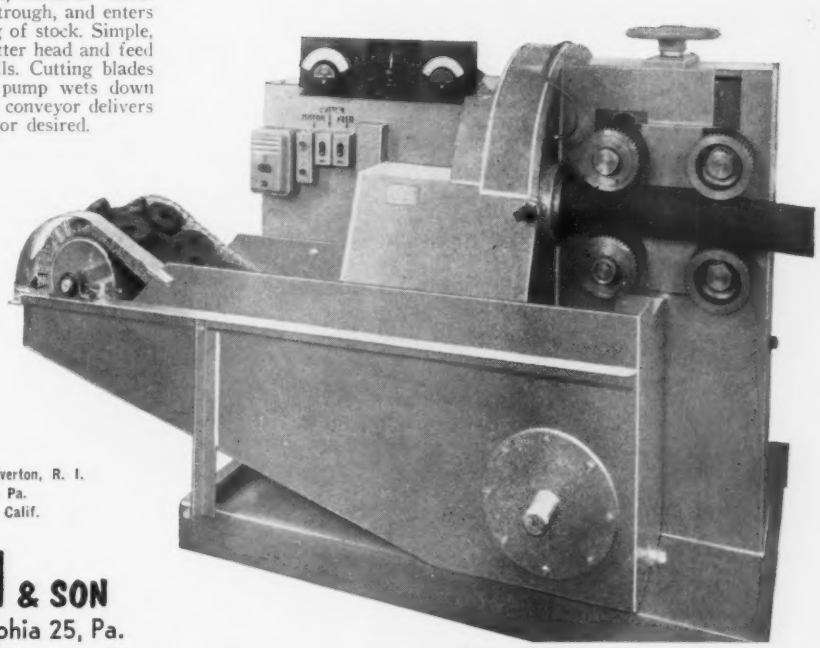

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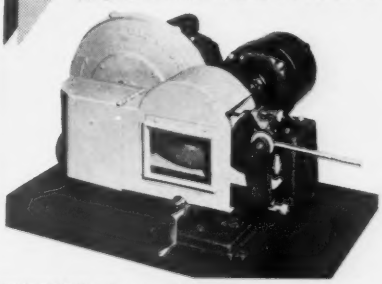

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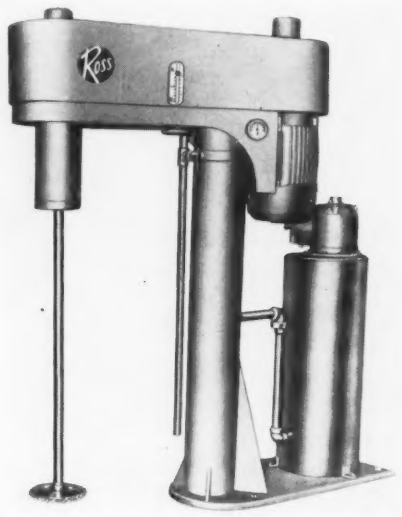
Ross High Speed Disperser

► A vertically-raised high-speed disperser has been added to the line of dispersing equipment manufactured by Charles Ross & Son Co., 148 Classon Avenue, Brooklyn 5, N. Y. The unit, designated Model No. 140DI, is a large capacity



machine which mixes, disperses and deagglomerates products of medium or heavy paste consistency up to 60,000 centipoises in any capacity between 100 and 800 gallons. Up to 60 hp motor drives are provided for processing the heaviest types of products, and variable speed drives, enable setting the shaft speeds anywhere between 600 to 3000 rpm. The advanced type impeller on the machine is a high impact, multiple action millhead with specially machined internal chambers. The machine centers in tanks up to 6 feet in diameter, and an automatic hydraulic cylinder permits raising from tanks up to 6 feet deep.

► Web Controls Corp., 318 Briarcliffe Road, West Englewood, N. J., has developed a versatile high-speed production slitter-winder machine for paper, plastic film, ferrous, and non-ferrous metals. The unit comes in widths ranging from 16 to 72 inches.

► A fully-automatic drilling machine for manufacturing heating platens has been developed by the Adamson United Co., 730 Carroll Street, Akron 4, Ohio. The machine operates by push-button control and accurately drills channels for circulating the platen heating and cooling medium.

► A line of high-speed pelletizers for chopping elastomeric materials is being manufactured by the L & P Tool Co., 2861 Sidney Avenue, Cincinnati 25, Ohio. Two models, Nos. 15 and 20, are available.

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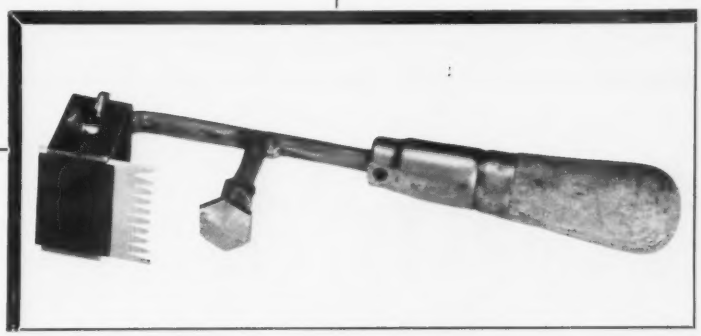

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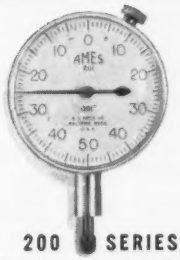

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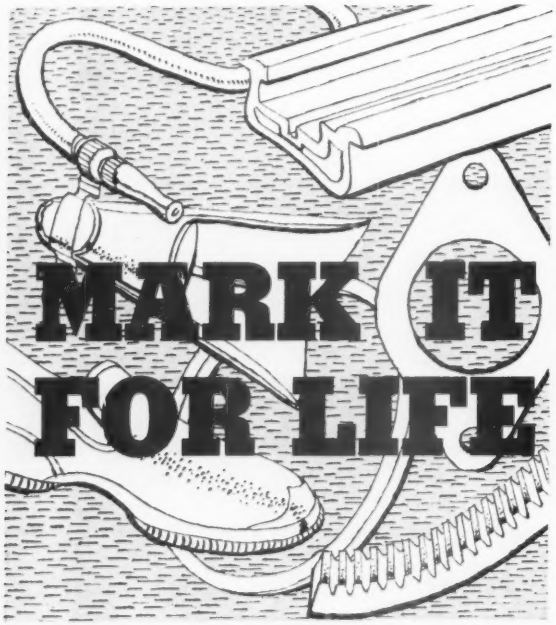

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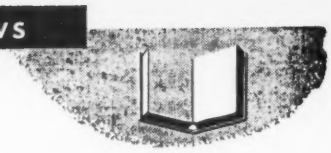
Reviews



Preparative Methods of Polymer Chemistry. By Wayne Sorenson and Tod W. Campbell. Published by Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 6¼ x 9¼ in. 337 pp. $10.50.

This book is a compilation of detailed procedures for the laboratory synthesis and handling of numerous types of polymers. It is designed both as a reference work and as a supplementary text for laboratory courses in polymer chemistry or advanced organic synthesis. The authors report that this type of reference work has been previously unavailable, and in making their assembly have relied on widely-scattered sources, including technical journals and patents. Where original literature did not contain sufficient data, additional material based on their own experience or that of their colleagues has been added. The authors are, respectively, research chemist and research manager at DuPont's Pioneering Research Division of the Textile Fibers Department.

The procedures assembled here have been divided into five basic types, containing most of the known classes of polymers and organic polymer-forming reactions. As defined, "polymer" is a substance of sufficiently high molecular weight, such that the properties have become reproducibly fixed. Among selections they have included are many familiar plastics and synthetic rubbers. The five basic categories used are: polycondensation and hydrogen transfer polymerization; addition polymers from unsaturated monomers; ring opening polymerization: non-classical routes to polymers, and synthetic resins.

Specific procedures, worthy of mention to those involved in synthetic rubber chemistry, are contained in the series on addition polymerization. Among them: butadiene, styrene-butadiene copolymers, butadiene-acrylonitrile copolymers, isoprene (as polymerized with n-butyl lithium, finely divided lithium and over a titanium-based catalyst), styrene-isoprene; isobutylene-isoprene, and chloroprene.

The book is well-documented with original sources of the preparations given in each instance. Drawings and illustrations used in the introductory chapter, on preparation, fabrication and characterization of polymers, are adequate.

BOOKLETS, CATALOGS, etc.

Handling and Storage of Toluene Diisocyanates. National Aniline Division, Allied Chemical Corp., 40 Rector St., New York 6, N. Y. 8½ x 11 in. 16 pp.

This bulletin describes how toluene diisocyanates, Nacconate-65, -80 and -100, should be handled. There are directions for unloading tank cars and tank trucks, handling drums, constructing storage tanks and transfer lines, cleaning storage tanks, and disposing of spillage. Recommendations are also provided for temperature and moisture control, avoiding hazards to health, first aid, type of safety equipment, and ventilation.

•

Naugatuck Chemical Latex. (Bulletin No. X-100). Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. 8½ x 11 in. 8 pp.

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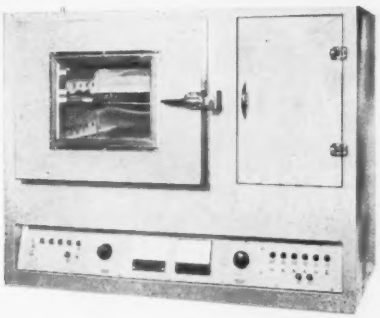

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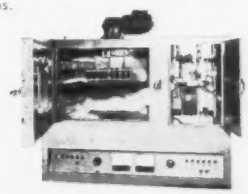

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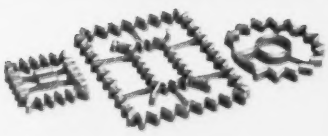

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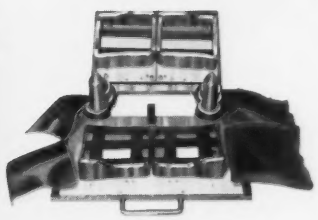

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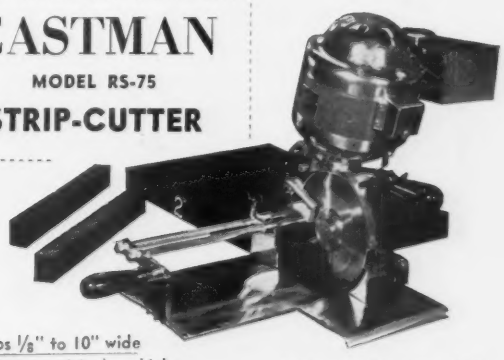

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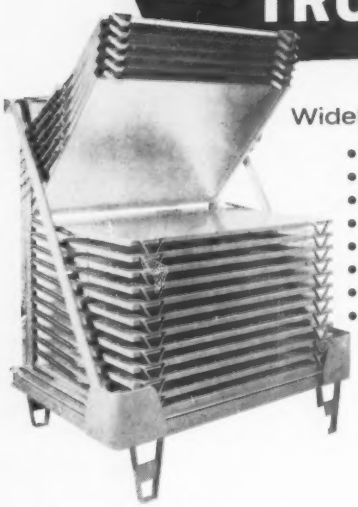

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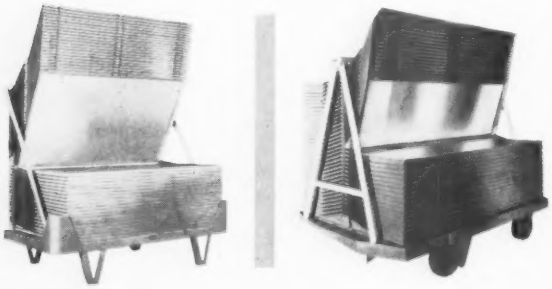

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Goodyear World-Wide. (Booklet No. 798). Goodyear Tire & Rubber Co., Akron, Ohio. 5½ x 8½ in. 24 pp.

This booklet can be used as a reference source for many facts of general interest about the company's history, current operations and growth. Addresses are listed for foreign and domestic production facilities, as well as rubber plantations. Brief general summaries are given of company operations in tires, shoe products, industrial rubber products, metal products, aviation products, films and flooring, foam rubber and chemicals.

•

Union Carbide Silicones. Silicones Division, Union Carbide Corp., 270 Park Ave., New York 17, N. Y. 8½ x 11 in. 16 pp.

This comprehensive booklet contains up-to-date information on silicones, and has been designed as an aid to engineers and technical personnel. Graphically illustrated with photographs, charts, and graphs, the booklet goes into detail about what silicones are, describes their uses for consumer and industrial products, and suggests ways in which they can be adapted to new applications by the design engineer or product development manager. Of special significance is the series of charts covering the properties and features of Union Carbide silicone fluids, resins, rubber compounds, water repellents, antifoams and emulsions, and their adaptability for use by the rubber, automotive, chemical, electronic, paint, paper, textile, glass, metal, aviation, and other industries.

•

This Is Rubber in the '60s. Rubber Manufacturers Association, Inc., 444 Madison Ave., New York 22, N. Y. 8½ x 11 in. 24 pp.

This illustrated report is aimed at those who use the thousands of rubber, plastic, synthetic, chemical, textile and metal products manufactured by the rubber industry. It gives the basic facts and figures about the industry, including tire shipments, production and inventory, United States and world rubber consumption, rubber manufacturers' sales and profits, as well as other important statistical data, and notes the emphasis the industry places on engineering, research and development.

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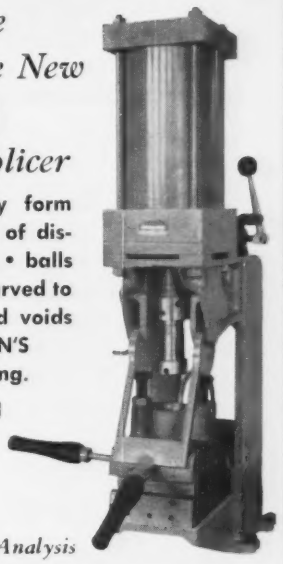

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

The price of natural rubber on the New York Commodity Exchange moved in a range of 137 points since our last report (May 1), high for the period being 32.75c reached on May 1, and low being 31.38c reached on May 24. The average price of spot rubber for the month of May was 32.04c based on 21 trading days compared with 31.21c in the previous month.

Merrill Lynch, Pierce, Fenner & Smith report that rumors are once again rife that GSA will reduce its minimum sales price. As usual, the rumor eminated from Singapore. In October, 1959, when the sales price was formalized by the government, initial information about it came from Asia, since details were classified for domestic release. April sales of natural from the stockpile totaled 4,361 long tons. About 107,256 long tons of natural have been sold from the stockpile from October 16, 1959 through April 30, 1961.

Administration Dispute

There have been reports that there is a behind-the-scenes dispute in the Kennedy Administration over what to do about the stockpile. It has been noted in many quarters that the perfection of the new natural-synthetics threatens to leave the United States "holding the bag" at a cost of untold millions.

The Office of Civil and Defense Mobilization and GSA believe the United States must speed up stockpile disposal now or face a multi-million dollar loss. The U.S. States Department, on the other hand, fears that U.S. "unloading" of the stockpile would depress the price of natural rubber and dissipate the good will which the United States has built up in natural rubber producing countries.

In 1959, the United States decided to sell 470,000 long tons of natural rubber from the stockpile. About 360,000 long tons have not been sold and the United States promised producing countries that it would not sell when the world price was less than 30c a pound.

Another 700,000 long tons represented the 1959 estimate of our security needs. In the light of the latest synthetic developments, however, the entire stockpile could be considered "surplus" in a few years.

Congress Asks Questions

During 1960 when natural rubber prices were at or near a 40c level, Great Britain disposed of its stockpile. Some Congressmen are now asking why the U.S. didn't take advantage of the high market of 1960 to sell surplus stocks. The question is also being asked as to why the U.S. allows other nations to use U.S. loan funds to buy natural rubber on the open market rather than forcing them to take our stockpiled surpluses.

NEW YORK, JUNE 1, 1961

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MAY 1 TO MAY 31

May	Spot	July	Sept.	Nov.	Sales
1	32.75	32.71	32.35	32.25	113
2	32.63	32.30	32.10	32.00	110
3	32.38	32.40	32.00	32.00	68
4	31.75	31.60	31.25	31.15	56
5	32.00	31.85	31.60	31.45	34
6	....	....	....	....	..
7	....	....	....	....	..
8	32.00	31.70	31.50	31.30	52
9	31.50	31.25	30.80	30.80	152
10	32.00	31.65	31.25	31.10	70
11	32.25	31.75	31.50	31.35	44
12	32.00	31.55	31.10	30.95	55
13	....	....	....	....	..
14	....	....	....	....	..
15	32.00	31.46	31.00	30.90	22
16	32.25	31.90	31.45	31.35	30
17	32.25	31.95	31.60	31.40	37
18	32.75	32.20	31.40	31.20	32
19	32.50	31.85	31.30	31.10	11
20	....	....	....	....	..
21	....	....	....	....	..
22	31.75	31.30	30.56	30.50	64
23	31.63	31.20	30.25	30.15	130
24	31.38	30.95	30.10	29.95	47
25	31.50	31.00	30.30	30.15	28
26	31.50	30.95	30.30	30.15	8
27	....	....	....	....	..
28	....	....	....	....	..
29	....	....	....	....	..
30	....	....	....	....	..
31	32.00	31.00	30.40	30.26	19

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.30¾
July	.30¾
Aug.	.30
Thin Latex Crepe:	
Spot	.33¾
Thin Brown Crepe, No. 2	.26¾
Flat Bark Crepe	.20¾

London Market
(Standard Smoked Sheets)

July	29.65 — 29.94
Sept.	29.80 — 29.64

Singapore Market
(Standard Smoked Sheets)

July	28.28 — 28.35

Middling Upland Quotations

	Apr. 28	May 31		
	Close	High	Low	Close
July	33.25	33.24	33.24	33.27
Oct.	34.07	34.09	34.09	34.08
Dec.	34.50	34.54	34.52	34.52

Notes & Quotes

J. W. Keener, president of the B. F. Goodrich Co., reports that a private "recession-rebound" campaign launched recently has spread around the world. Mr. Keener states that large lapel buttons which proclaim "Business is good! As good as I make it!" are being worn by thousands of Goodrich employees and customers throughout the free world. The firm originally ordered 100,000 buttons and has since reordered an additional 30,000.

Synthetic Rubber

In the first four months of the current year a total of 428,056 long tons of synthetic rubber were produced in the United States, about 80,000 long tons less than in the first four months of the preceding year.

As for consumption, in the first four months of this year, 332,597 long tons of synthetic rubber were consumed in the United States, about 44,000 long tons less than in the first four months of 1960.

In the first four months of 1960, however, synthetic rubber consumption accounted for 67.45 per cent of all the new rubber consumed. In the first four months of this year, the figure had risen to 71.14 per cent.

The Matter of Cost

Trade sources observe that the impact of synthetic rubber as a substitute for natural is becoming increasingly evident as the number of companies attempting to produce synthetic rubbers at costs below present natural prices grow. Goodyear, for example, has announced a new process for the production of isoprene. The company states that the new process would permit the production of "Natsyn" synthetic-natural rubber at a maximum cost of 25c per pound.

These, and other moves in this direction, are having increasing political impact. Some Congressmen are beginning to ask pertinent questions as to the natural rubber stockpile maintained by the government and the necessity for its existence. Why, it is being asked, didn't the United States take advantage of the high market of 1960 to get rid of surplus stocks, particularly when synthetic rubbers are available for military purposes?

The answers to such questions have been coming not from economic sources but from the Department of State which wishes to continue the original disposal timetable—about 50,000 long tons of natural rubber a year for nine years. Such a program, under present conditions, takes little account of price structure or other factors relating to the marketplace. These programs, of course, are related to the realities of the cold war and the effect which a rapid disposal program would have on the rubber producing nations of the Far East.

Political Considerations

Whatever struggles now exist between natural and synthetic rubbers are being fought less on technical or even price situations than they are on political considerations. Under these circumstances, analyses of market conditions are only peripheral—the real battles are taking place elsewhere under different ground rules.

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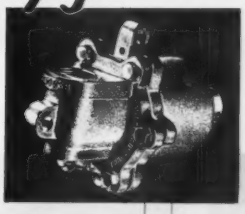

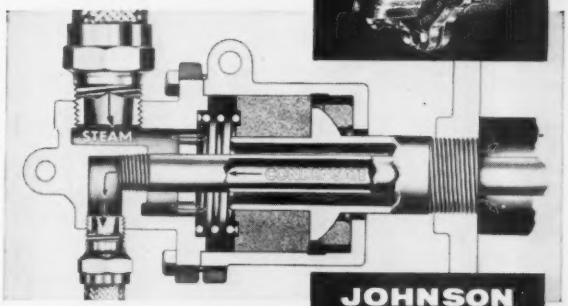

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Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

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Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1509 and 1511	.2410
Ameripol 1000 and 1001	.2410
Ameripol 1605	.1900
Ameripol 1606	.1820
Ameripol 1608	.1845
Ameripol 1609	.2080
Ameripol 1610	.1870
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Ameripol 4604	.2410
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Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4664	.1845
Ameripol 4667	.2080
Ameripol 4700	.1750
Ameripol 4756	.1545
Ameripol 4758	.1450
Ameripol 4759	.1598
Ameripol 4760	.1576
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500 and 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
ASRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown B-129	.1960
Baytown B-134	.1900
Baytown B-172	.1825
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
Baytown 1811	.1569
Baytown 8675	.1820
Baytown 8676	.1876
Baytown 8677	.1820
Baytown 8678	.2080
Baytown 8679	.2022
Baytown 8680	.1775
Baytown 8681	.1835
Baytown 8775	.1545
Baytown 8776	.1679
Baytown 8777	.1550
Baytown 8778	.1480
Baytown 8779	.1496
Baytown 8780	.1507
Baytown 8781	.1655
Baytown 8782	.1583
Baytown 8783	.1515
CB-102 (Shell)	.2300
Carbomix 1606	.1820
Carbomix 1608	.1845
Carbomix 1609	.2080
Carbomix 1808	.1480
Carbomix 1809	.1545
Carbomix 1811	.1569
Carbomix 1813	.1640
Carbomix 1814	.1545
Carbomix 1815	.1496
Carbomix 1817	.1715
Carbomix 3761	.1576
Carbomix 3764	.1685
CB-102 (Shell)	.1850
Copo 1006	.2410
Copo 1500	.2410
Copo 1502	.2410
Copo 1505-NS	.2610
Copo 1507	.2410
Copo 1510	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
Copo 1778	.1910
FR-S 146	.2410
FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500 and 1502	.2410
FR-S 1703	.2060
FR-S 1710 and 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1015	.3500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.3050
Naugapol 1023	.3300
Naugapol 1503	.2625
Naugapol 1504	.3500
Naugapol 6003	.2700
Naugapol 6100	.3200
OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1608	.1845
Philprene 1609	.2080
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Philprene 1808	.1480
Pioflex 1006	.2410
Pioflex 1500C	.2410
Pioflex 1502	.2410
Pioflex 1507	.2410
Pioflex 1508	.2410
Pioflex 1510	.2410
Pioflex 1712C	.1885
Pioflex 1713	.1750
Pioflex 1714C	.1725
Pioflex 1773	.2060
Pioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
Polysar Krynol 651	.1885
Polysar Krynol 652	.1910
Polysar S-630	.2410
Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2410
S-1002	.2435
S-1006	.2410
S-1009	.2475
S-1011	.2475
S-1013	.2410
S-1500	.2410
S-1502	.2410
S-1509	.2410
S-1703	.2060
S-1707	.1910
S-1709	.1885
S-1710	.1885
S-1712	.1885
S-1778	.1910
S-7501	.2410
S-7652	.1960
S-7702	.1750
SP-102	.3000
SP-103	.3000
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.4700
Hypalon 30	.6000
Hypalon 40	.5000

SYNTHETIC RUBBER POLYMERS

Fluoroelastomers

Fluorel	$10.25 [2]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [2]
Viton B	$10.00 [2]

Neoprene

(prices l.c.l.)

Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [3]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3900 [3]
Neoprene Type WRT	.4500 [3]
Neoprene Type WX	.4100 [3]

Polysulfide Rubbers

(prices l.c.l.)

Thiokol Type A	.5000 [3]
Thiokol Type FA	.6900 [3]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

(prices l.c.l.)

GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	2.56 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [1]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [3]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [1]
Naugatex J-9064	.3050 [1]
Pliolite 2000 and 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105 and 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 400	.3000 [3]
Tylac 405, 430, 450-A	.2750 [1]
Tylac 410 and 420	.2900 [1]
Tylac 450-A	.2750 [1]
Tylac 3040 and 3340	.3200 [1]

Butyl

Butyl Latex 80-21	.3500 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Suppliers are your Materials Listed in the Market Prices Section?
If not, forward full information to —
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MARKETS

(continued)

Reclaimed Rubber

The Rubber Manufacturers Association advises that in the first four months of the current year a total of 85,426 long tons of reclaimed rubber were produced in the United States against the 108,716 long tons produced in the first four months of the previous year.

As for consumption, in the first four months a total of 81,890 long tons of reclaim were used in the United States compared with the 103,319 long tons used in the first four months of 1960. Stocks on hand as of April 30, 1961 amounted to 32,215 long tons, equal to about a month and one-half supply at the current consumption rate.

If the rest of the year sees the same consumption rate for reclaim, something like 240,000 long tons will have been consumed at year end. The general pick-up in business activity may bring this figure somewhat higher although expectations in this direction are not too great at the moment.

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¾
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

The trade reports that the market for scrap rubber is maintaining the slow rise of recent weeks with movements of fair tonnages. Consumption has picked up somewhat and is at par or slightly ahead of last year. As of April 30, 1961, 79,578 long tons of scrap rubber had been consumed in the United States.

Price levels for all items remain virtually unchanged after the recent rise in mixed automobile tubes and butyl tubes. As of April 30, 1961, there were 65,877 long tons of scrap rubber in stocks on hand, just about equal to a three-month supply. Current prices for scrap rubber follow:

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.06
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.06¼

Tire Fabrics

Goodyear has reported "encouraging progress" in the development of synthetic fibers for use as a new tire cord. Two new groups, polyester and polyolefin, have undergone extensive research and testing. The company's experiments with polyester fibers such as DuPont's Dacron and Beaunit's Vycron have been under way for some time to keep pace with higher driving speeds and faster airplane landing speeds. The company states that the polyester fibers show the most immediate promise.

Experimental tires with polyester cord construction exhibit the high strength and bruise resistance of nylon cord tires, but without flatspotting, company officials state. One of the problems in incorporating polyester cord into tires has been poor adhesion, but a new system has provided a great step toward new progress.

Potential Advantages

Polyolefin fiber appears to hold the most potential advantages in long range development, it is maintained. Quantity production of polyolefin cord tires is apparently a long way off, but the potential is great and well-worth the long range emphasis on this type of material in the company's opinion.

Goodyear claims that polyolefin advantages include high strength, good fatigue resistance and light weight, a factor in producing a cooler running tire. Polyolefin is the only one of the experimental fibers now under study that is lighter than nylon.

Both polyester and polyolefin fibers are made from petroleum derivatives and depend on reactive processes in which chemical linkage ties together groups of molecules to form long chains of "super" molecules.

The difference, is that the polymerization process used to make polyester fibers does not control the arrangement of the molecules along the chain. Thus, the molecular arrangement in a polyester fiber does not allow a fixed pattern.

In polyolefin fibers, Goodyear notes, the arrangement of the molecular groups, formed by stereospecific polymerization, is controlled on a three-dimensional basis. This molecular control makes for greater fiber strength and provides other desirable characteristics. In the final analysis, molecular control may decide the fiber that will be used in future tires.

(Prices f.o.b. Shipping Points)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: In the first four months of this year, according to the Rubber Manufacturers Association, a total of 16,401 long tons of natural rubber latex were imported into the United States against the 21,213 long tons imported in the first four months of the preceding year.

Consumption of natural rubber latex in the first four months of this year amounted to 13,683 long tons, compared with the 20,000 long tons consumed in the first four months of 1960. As of April 30, 1961, there were 9,470 long tons of natural latex in stocks on hand, just about equal to a two-month supply.

Natural rubber latex is now selling at about a 37 to 38c level at East Coast ports in car load lots. At this level, natural latex should be doing a little better statistically than it has.

At the present consumption rate about 40,000 long tons of natural rubber latex will be consumed in 1961. There does not seem to be any indication on the horizon that this figure will rise or fall to any appreciable degree in the near future.

Synthetic: The market during the past period has remained featureless, although the synthetic latices are continuing their steady, if unspectacular, pace. The introduction of butyl latex will be of interest from a statistical point of view although it will be some time before it can be determined if this type of latex is finding new markets or making inroads into those markets held by other synthetic types.

Cotton

The price of middling uplands on the New York Cotton Exchange moved only 35 points since our last report (May 1), high for the period being 34.25c reached on May 26 and 31, and low being 33.90c reached on May 1 and on four other days during the month. The average price of middling uplands for the month of May was 34.07c based on 21 trading days. This compares with an average of 33.62c in the previous month.

The Commodity Credit Corporation in its final report of the season reported purchases under the "A" program to May 26, 1961, totaled 7,791,220 bales; sold 7,081,053 bales, leaving an unsold stock of 121,386 bales. The CCC also made loans on 540,273 bales; repossessed 415,891 bales, leaving a net loan stock of 124,382 bales.

Meanwhile, GSA has 109,000,000 pounds of long staple cotton in its stockpile of strategic material and is still seeking Congressional authority to sell it. The agency has been trying to get approval from Congress since 1957 and has been permitted to dispose of only 50,000 bales. GSA paid $128,000,000 for the cotton that is now said to be worth $45,000,000. It is said to cost $500,000 each year to store the cotton.

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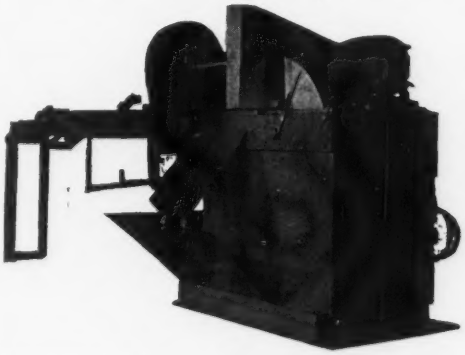

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An authoritative survey on how microscopy can be used in rubber science and technology

Microscopy of Rubber

BY C. H. LEIGH-DUGMORE

72 Pages 5¾ x 8½ Inches Illustrated

It is interesting to note that although the electron microscope was developed barely 30 years ago, it has been applied to the study of rubber structure since 1940. The value of microscopy, however, depends as much on the experience of the microscopist in interpreting what he sees as on his ability to prepare his specimens well and to operate his microscopes efficiently. This book will help the microscopist by showing him where and how to look for the needed experience. It also indicates to others how an experienced microscopist will be able to help them. The term "rubber" as used in the book takes in elastomers in general and not natural rubber alone.

CONTENTS

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II. Techniques
III. Polymers
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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

JUNE 1, 1961

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1961 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.60	.61
Accelerator 108*	lb.	—	.92
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.92
Altax*	lb.	.54	.56
Amax*	lb.	.75	.77
No. 1*	lb.	.71	.73
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.68
Bismate, Rodform*	lb.	—	3.00
Butazate 50D*	lb.	.87	.89
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Captax*	lb.	.44	.46
C-P-B*	lb.	—	1.95
Cumate, Rodform*	lb.	—	1.45
Cydac*	lb.	.71	.73
Delac S*	lb.	.71	.73
DIBS*	lb.	—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.51	.52
Dithiocarbamates Cyzate B & E	lb.	.85	.89
El Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.89
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Geigy Amines	lb.	.46	.52
Guanital*	lb.	.62	.69
Hepteen Base*	lb.	—	1.85
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Grains*	lb.	.54	.56
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.50	.57
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.71	.73
Special*	lb.	.75	.77
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.25
Rotax*	lb.	.50	.52
RZ-50-A* and B*	lb.	.70	1.00
Santocure*; NS*	lb.	.71	.78
.26*	lb.	.75	.82
Selenac* (Ethyl, Methyl)	lb.	—	3.00
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.75
Tellurac Rodform (80%)	lb.	—	1.40
Tepidone*	lb.	.45	.45
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiazole ZMBT	lb.	.55	.57
Thiofide*	lb.	.54	.61
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Cyuram DS & MS	lb.	1.14	1.14
Trimene*	lb.	.56	.58
Base*	lb.	1.03	1.06
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	—	2.45
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite AM*	lb.	.76	.78
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	—	1.04
Zimate* (Ethyl)	lb.	—	1.04
Zimate* (Methyl)	lb.	—	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210* and 211*	lb.	.14¾	.17¼
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.11½	.14
DAR-S*	lb.	.12¼	.14¾
DAR-HY*	lb.	.16¾	.19¼
Groco 56*	lb.	.12¼	.14¼
Hydrofol Acids*	lb.	.11½	.20½
Hyfac 430*	lb.	.17	.19½
Neo-Fat H.F.O.*	lb.	.14½	.15¾
Neutrex*	lb.	.15	.17½
Stearite*	lb.	.11¾	.14¼
Talene*	lb.	.16¼	.18¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 730*	lb.	.10¾	.13¼
731*	lb.	.16¾	.19¼
732*	lb.	.17¾	.20¼
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.13¾	—
National Lead*	lb.	—	.13¾
SB*	lb.	—	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼	—
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.03½	.06½
Michigan No. 15*	lb.	.05½	.06½
Morton's Magnesia	lb.	.25¼	—
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
DCI Technical*	lb.	.21½	.23½
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.24¾	.27¼
Genmeg MLW*	lb.	.25¼	.27¾
Light Calcined Magnesia No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.25¼	—
K*	lb.	.25¾	.27
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Seamag*	lb.	.20	.20½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.24¼	.26½
Michigan 1782 Magnesia*	lb.	.25¼	.26½
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¼	.32
Oleic Acid			
Dar-Chem* 105	lb.	.18¾	.21¼
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210*	lb.	.18¾	.21¼
Groco Red Oil	lb.	.18¾	.21¼
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20
Wochem 310, 311	lb.	.17¼	.19¾
Palm Fatty Acids			
Groco 45*	lb.	.15½	.18
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15½	.18
281*	lb.	.16	.18½
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.14¼	—
National Lead*	lb.	.14¼	.14¾
No. 2 RM*	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.15¼	.17¾
Dar-Chem 11*	lb.	.17½	.20
Emersol 110*	lb.	.17½	.20
Neo-Fat 18-53*	lb.	.14¾	.16¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.15¾	.18¼
Dar-Chem 12*	lb.	.18	.20½
Emersol 120*	lb.	.18	.21½
Groco 54*	lb.	.18	.20½
Neo-Fat 18-54*	lb.	.15¼	.17¼
Stearic Acid, Other			
Century 1230*	lb.	.17½	.20
1240-Supra*	lb.	.17½	.20
Extra Pearlstearic*	lb.	.17½	.20
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¼
18-61*	lb.	.16¼	.18¼
Stearex*	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¼
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.12¼	.14¾
721*	lb.	.12¼	.14¾
White Lead Basic Carbonate	lb.	.18	.19
White Lead Basic Sulfate	lb.	.17	.18
Zinc Laurate Laurex*	lb.	.37	.39
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
DCI Magnesium Carbonate*	lb.	.11	—
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.18½	.21
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

Furniture by Walter Nugent Designs, Oakville, Ontario, Canada

POLYSAR LATEX 723

—an entirely new foam rubber latex

Polysar* Latex 723 has been developed to completely replace natural latex in the manufacture of foam rubber—to give a finished product with the highest load-carrying (modulus) characteristics of any latex now available.

These improvements result from an extension of the freeze-agglomeration technique used by Polymer for the production of high solids latices. Wherever foam rubber is required, the use of a synthetic latex alone offers advantages in handling and processing. These, combined with the higher modulus of Polysar Latex 723, will produce substantial savings for the foam manufacturer.

For complete information, write: Marketing Division, Polymer Corporation Limited, Sarnia, Canada. Ask for Technical Report No. 11:2A

*Trade Mark Reg'd.

POLYSAR

ONE OF THE WORLD'S MAJOR SOURCES OF RUBBER

Important cost saving features of POLYSAR LATEX 723

You benefit from these advantages

1 Storage and Handling: store only one stable latex at high solids; no de-ammoniation is necessary before compounding.

2 Compounding and Processing: use only a small amount of soap and no auxiliary stabilizers; a high amount of zinc oxide may be added to the initial compound before maturing.

3 Foam Physical Properties: highest load carrying capacity of any latex foam rubber; with adequate processing control, properties are not sensitive to minor compounding variations; good age resistance; flex properties equivalent to natural latex foam.

TYPICAL LATEX PROPERTIES

Former designation	XPRD-860
Ratio of butadiene/styrene	70/30
Latex total solids (%)	65
pH	10.5
Viscosity (Brookfield LV, No. 3 spindle)	
—at 12 rpm. (poises)	18
—at 30 rpm. (poises)	11
Free styrene (%)	0.03
Formaldehyde preservative (ppm.)	300
Mechanical stability	good
Storage stability	very good
Coagulum on 80 mesh screen (% of dry weight)	0.04
Average particle size (Angstrom units)	1200
Mooney viscosity of contained polymer (ML/4)	150
Density of dry latex solids (g./cc.)	0.950

TYPICAL COMPOUND PROPERTIES

(for recipe based on 100% Polysar Latex 723 and 10 parts clay filler)
After curing (25 minutes in steam 212°F) and drying.

Density	lb./cu. ft.	g/cc	Compression resistance, RMA (lb/50 sq. inches at 25% deflection)
Low	4.5	.072	12.5
Medium	6.5	.104	32.5
High	8.5	.136	61.0

Density	lb./cu. ft.	g/cc	Tensile Strength (p.s.i.)
Low	4.5	.072	6.0
Medium	6.5	.104	8.8
High	8.5	.136	13.4

Elongation at Break (%)	190
Compression Set (%)	6.8
Volume Shrinkage (%)	13.7

Aged in Air (% change after 22 hours at 212°F)	
	Compression Resistance + 9
	Tensile Strength −13
	Elongation at Break −31

distributors

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POLYMER CORPORATION LIMITED
POLYSAR
SARNIA CANADA
*Trade Mark Reg'd.

DISTRIBUTORS IN 43 COUNTRIES

POLYMER CORPORATION LIMITED • SARNIA • CANADA

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	——	.20
Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	.1-½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foammix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.03	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¾
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L-61*	lb.	.35½	.39
RS-968*	lb.	.38	.38½
Terpinol [illegible] No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agerite 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
DPPD*	lb.	1.12	1.14
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
ISO*	lb.	1.82	1.84
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superflex*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C* Pellets	lb.	.85	.87
CD*	lb.	.79	.81
Aminox*	lb.	.57	.59
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	——	3.25
Betanox Special*	lb.	.94	.96
B-L-E*	lb.	.57	.59
Catalin CAO No. 1*	lb.	.57	.60
CAO No. 3*	lb.	.65	.68
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	——	3.50
Dalpac 4	lb.	.57	.60
Deenax*	lb.	.57	.60
Diphenylamine	lb.	.31	.33
Di-tert-Butyl-para-Cresol*	lb.	.86	1.16
DBPC*	lb.	.54	.60
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.81
Ionol*	lb.	.57	.60
Naugawhite*	lb.	.57	.59
Powder*	lb.	.57	.59
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	——	.21½
BF-13*	lb.	——	.25½
BF-78*	lb.	——	.55
BF-Acid*	lb.	——	.85
Octamine*	lb.	.57	.59
Oxidex*	lb.	——	3.60
PDA-10*	lb.	.46	.48
Pennox* A, B, C, D	lb.	.57	.72
Permalux*	lb.	——	2.25
Polygard*	lb.	.57	.59
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
Sodium Nitrate	cwt.	8.75	11.00
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	1.05	1.07
Wing-Stay S*; T*	lb.	.56	.67
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

ANTIOZONANTS

Eastozone*; 32*	lb.	1.15	1.18
Eastozone 36	lb.	——	2.00
6-H	lb.	1.25	1.27
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms)	lb.	1.05	1.07
Wing-Stay 100*	lb.	1.00	1.08

ANTI-SCORCHING AGENTS

Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	——	4.35
Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.73
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¼	.12¾
Opex 40	lb.	——	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	2.55
Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201, 203	gal.	5.00	7.50
220	gal.	8.95	12.00
EX-B501-4	gal.	6.20	9.40
EX-B150-1	gal.	8.15	11.00
607	gal.	15.00	24.00
EX-B579-1	lb.	19.40	26.00

BONDING AGENTS (Cont'd)

Durez 12987*	lb.	.47½	.49
EX-B501-4	gal.	6.20	4.90
EX-B150-1	gal.	8.15	11.00
EX-B579-1	gal.	19.40	26.40
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Plobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¾	.12⅛
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	2.20	3.40
Harmon Blue Toner B-4776	lb.	——	2.90
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	1.60	3.25
Stan-Tone MBS*	lb.	2.20	2.92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green* 413*	lb.	1.60	2.80
	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Harmon Green Toner G-5056	lb.	——	3.95
Hi-Fiz Fluorescent	lb.	1.60	2.60
Monastral Rubber Green GSD* (Dispersed)	lb.	——	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	——	1.45
Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	4.05

COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.73
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.80
X-2669 Medium Light*	lb.	—	1.88
X-2670 Medium*	lb.	—	1.95
X-2671 Dark*	lb.	—	2.03
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb.	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.27½	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal*	lb.	.09	.09¼
R-22*, R-25*, R-27*, R-30*	lb.	.09⅜	.09⅞
R-60*	lb.	.09⅝	.10⅛
Ti-Pure*	lb.	.24½	.27½
Anatase Grades*	lb.	.25½	.26½
R-100*, R-500*	lb.	.27⅝	.28½
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14⅜	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09⅝	.10⅛
RC-HT* (dlvd.)	lb.	.09⅜	.09⅞

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1250	.1350
AZO-ZZZ 11*, 22*, 33*, 44*, 55*	lb.	.1250	.1350
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1250	.1350
Florence Green Seal*	lb.	.1450	.1550
Red Seal*	lb.	.1450	.1550
White Seal*	lb.	.1475	.1575
Kadox 25*	lb.	.1350	.1450
15*, 17*, 72* & 515	lb.	.1300	.1400
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1600	.1700
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
35%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure			
Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.55
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.70	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¾
Darvan No. 1*	lb.	.25¼	.38¼
No. 2*; No. 3*	lb.	.23¾	.36¾
No. 6*	lb.	.18½	.19
No. 7*	lb.	.26¼	.36¼
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Furala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9N*; 11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¼
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¼
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*; W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	—	.35
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate			
AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	126.50
Barytes			
No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	60.00	84.85
Sparmite*	ton	80.00	90.00
XIOR*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate			
Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l. ton		—	10.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCC "G"*	ton	15.00	17.00
CCC No. 1*	ton	10.50	12.50
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lesamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	65.00	85.00
SC* (and T*)	ton	117.50	137.50
U*	ton	127.50	147.50
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	150.00
RC*	ton	117.50	140.00
York White*	ton	—	11.50

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FILLERS (Cont'd)

Calcium Silicate			
Silene EF*	lb.	.06	.06½
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	——	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	——	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	——	35.00
OMYA Whiting*	ton	——	35.00
Clay			
Afton Clay*	ton	13.00	38.00
Aiken Clay*	ton	14.50	——
Akron HC-100*	ton	14.50	——
HC-75*	ton	13.00	——
SC-25*	ton	14.50	——
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Barden R*	ton	7.50	12.00
Buca* (c.l.)	ton	——	45.00
Burgess No. 20*	ton	——	33.00
No. 30*	ton	——	40.00
Burgess Iceberg*	ton	——	53.00
Icecap K*	ton	——	65.00
Catalpo* (c.l.)	ton	33.00	——
Champion*	ton	——	14.50
Crown*	ton	——	14.50
Dixie* (c.l.)	ton	——	14.50
Dover*	ton	——	13.00
Franklin Clay—R* (c.l.)	ton	16.00	41.50
G. K. Soft*	ton	11.50	32.00
Glomax HE (bags)	ton	65.00	——
LL (bags)	ton	53.00	——
PVR (bags)	ton	40.00	——
WZ (bags)	ton	45.00	——
Harwick Clays*	ton	21.50	77.00
Hydrite RS (bags)	ton	30.00	——
PXS (bags)	ton	45.00	——
UF (bags)	ton	100.00	——
10S (bags)	ton	50.00	——
Flat "D" (bags)	ton	25.00	——
Hi-White R*	ton	10.00	14.50
Kaolloid Clay* (c.l.)	ton	——	10.50
LGB*	ton	13.00	17.50
LGP*	ton	15.50	20.00
McNamee* (c.l.)	ton	——	14.50
Natka 1200	ton	12.00	35.00
Par* (c.l.)	ton	——	12.00
Paragon*	ton	10.00	14.50
Pigment 5*	ton	27.50	34.50
33*	ton	——	40.00
Polyfil 40	ton	40.00	——
70	ton	53.00	——
80	ton	65.00	——
C	ton	25.00	——
F	ton	45.00	——
X	ton	30.00	——
Recco* (c.l.)	ton	——	14.50
Swanee Clay*	ton	——	12.50
Snobrite*	ton	——	12.50
Suprex*	ton	10.00	14.50
Whitetex* (c.l.)	ton	53.00	——
Windsor*	ton	14.50	39.50
4200 Clay*	ton	13.00	——
Diatomaceous Earth	ton	30.00	50.00
Celatom MN-33	ton	36.00	95.00
MP-25	ton	55.00	121.00
MP-63	ton	55.00	121.00
Celite 270	ton	55.00	121.00
292	ton	36.00	95.00
315; 350	ton	137.00	225.00
Kaylorite* (c.l.)	ton	——	30.00
Lorite*	ton	——	36.00
Flock			
Cotton (White)	lb.	.28	.30
Colored	lb.	.12	.20
Filfloc F 40-9000*	lb.	——	.13
F 6000*	lb.	——	.36
Nylon	lb.	——	.35
Polycel*	ton	110.00	210.00
Rayon, Bleached or Dyed	lb.	.75	1.20
Rayon, Grey	lb.	——	.18
Rayon, Pink	lb.	——	.20
Solka-Floc* (l.c.l.)	lb.	.07	.16
Glue, Amber	lb.	.17	.19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	100.00
Leather			
Flour (dust)	lb.	.12	.15
Shredded	lb.	.03	.17
Lignin	lb.	.06	.08
Limestone, Pulverized	ton	3.00	5.00
Asbestol Regular*	ton	28.00	——
Asbestol Superfine*	ton	33.00	——
Georgia Marble No. 10*	ton	——	11.00
Industrial Filler No. 100*	ton	——	7.75
Micro Velva A*	ton	53.00	——
L*	ton	61.00	——
No. 1 White*	ton	——	11.00
Magnesium Carbonate	lb.	.10½	.13
K & M Technical* (c.l., eqld.)	lb.	.10½	.12
Marinco CL*	lb.	.11	.13
Michigan*	lb.	.11	.15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	.07¾
Concord*	lb.	.08	.08¾
Micro-Mica*	lb.	.08	.08¾
Mineralite* (c.l.)	ton	40.00	85.00
Silversheen*	lb.	.08	.08¾
Triple A Mica* (c.l.)	ton	——	40.00
Vermiculite*	lb.	——	.11
Wet Ground Biotite Mica	lb.	.06½	.07¼
Wet Ground Mica No. 160*	lb.	.08	.08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	——	11.50
Pyrax A* (c.l.)	ton	14.50	15.00
WA* (c.l.)	ton	17.00	17.50
Sawdust, Graded	ton	14.00	35.00
Silica	ton	16.00	27.00
Extra Fine (bags) (c.l.)	ton	——	43.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Lo-Micron Slate Flour*	lb.	——	.04½
No. 133 Slate Flour*	ton	——	4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	.07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	——	9.75
Asbestol Regular*	ton	——	27.00
Eastern RC-500*	ton	——	32.00
No. 41*	ton	——	19.70
No. 549*	ton	——	63.00
French*	ton	——	59.00
No. 367*	ton	——	13.00
No. 1600*	ton	——	70.60
No. 1768*	ton	——	13.00
Nytal 200* (c.l.)	ton	——	28.00
300* (c.l.)	ton	——	38.00
Sierra Fibrene C-400*	ton	34.00	40.00
Sierra Supreme 325*	ton	51.00	56.00
Sierra White*	ton	21.75	26.75
Soapstone*	ton	——	13.00
Walnut Shell Flour	ton	55.00	100.00
Agrashell*	ton	55.00	115.00
Stan-Shell*	ton	50.00	110.00
Whiting, Commercial	ton	——	7.50
Allied Whiting*	ton	——	11.50
Camel-Carb*	ton	——	10.00
Calwhite (c.l.)	ton	——	20.00
C-C-O White*	ton	——	22.00
Georgia Marble No. 15*	ton	——	20.00
No. 10*	ton	——	20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	10.00
No. 2 LS* (c.l.)	ton	10.00	10.00
Snowflake* (c.l.)	ton	20.00	22.00
Stan-White 325*	ton	11.50	14.10
Ultrasil*	lb.	.35	.50
Veroc* (c.l.)	ton	——	11.50
Welco* (c.l.)	ton	——	10.50
York White R* (c.l.)	ton	——	11.00
Wood Flour	ton	31.50	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	2.35
Black Out*	gal.	4.50	8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	37.90
Shellac, Orange Gum	lb.	.35	.45
VanWax*	gal.	2.00	2.05

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	——	.65
Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
Halowax*	lb.	.36	.46
Zinc Borate 3167*	lb.	.1920	.2020
Zyrox Compounds*	lb.	.38	.95½

LATEX MODIFIERS

Crux*	lb.	.30	.65
Foamnix*	lb.	.60	1.50
Ludox	lb.	.15	.16¾
Nopco EB*	lb.	.16¾	.18¾
EB-1*	lb.	.16¾	.18¾
EB-5*	lb.	.19½	.21½
OPD-101*	lb.	.29	.40
Piccopale A-1 Emulsion	lb.	.086	.113
A-20	lb.	.089	.116
A-22	lb.	.097	.124
A-41; A-43	lb.	.0775	.0145
C-1	lb.	.091	.118
N-3	lb.	.100	.127
STAYB*	lb.	.25	.45
Syton 200	lb.	.15	.16¼
Ubatol U-2001* (t.c.)	lb.	.166	.187
U-2003* (t.c.)	lb.	.184	.208
U-2007* (t.c.)	lb.	.166	.187
U-3025* (c.l.)	lb.	.223	.235
U-3040* (c.l.)	lb.	.260	.272
U-3045* (c.l.)	lb.	.260	.272
U-3050* (c.l.)	lb.	.195	.207
Webnix*	lb.	1.25	2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	——	.165
Alipal CO-433*	lb.	——	.20
CO-436*	lb.	——	.24
Aluminum Stearate Crown Brand*	lb.	.37	.42
Amine, Mixed Crude*	lb.	.19	.25
Aquadag*	lb.	3.50	4.00
Aquarex D*	lb.	——	.81
L*	lb.	——	.94
ME*	lb.	——	.82
MDL*	lb.	——	.33
WAQ*	lb.	——	.22
Armeen HT*	lb.	.34	.40
180*	lb.	.52	.56
Armid HT (flaked)*	lb.	.42	.46
0*	lb.	.39	.41
Borax Granular (l.c.l.)	ton	89.00	94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	.32
CD Mold Release B*	gal.	5.00	——
B-4*	gal.	5.00	——
Colite Concentrate* (dms.)	gal.	.90	1.15
Colite D43D*	gal.	1.15	1.40
Concentrex*	lb.	——	.25
Dag Dispersion No. 197*	lb.	1.95	2.90
D.C. 7 Compound*	lb.	4.70	5.80
D.C. Emulsion No. 7*	lb.	1.59	2.07
No. 8*	lb.	1.15	1.69
No. 35*; 35A*	lb.	1.15	1.69
No. 35B*	lb.	1.15	1.69
No. 36*	lb.	1.15	1.69
D.C. Mold Release Fluid*	lb.	2.90	3.47
Dri-Lube*	lb.	——	.22
Dry-Flo* (50 lb. bags)	lb.	21.40	——
Emulsion Lubricant A80*	lb.	——	1.20
45*	lb.	——	1.20
G-E Silicone Emulsion			
SM-55*	lb.	1.15	1.69
SM-61*	lb.	1.15	1.69
SM-62*	lb.	1.15	1.69
G-E Silicone Fluid SF-92*	lb.	2.90	4.05
SF-96*	lb.	2.90	4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	.13¼
Igepal CO-430*	lb.	——	.29
CO-630*	lb.	——	.29
CO-530*	lb.	——	.29
Igepon AP-78*	lb.	——	.48
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
Kokobace R*	lb.	.17½	.18½
Lipal 9-N*	lb.	.28	.29
7-O*	lb.	.29	.30
Lubrex	lb.	.25	.30
Lubri-Flo*	gal.	10.00	12.00
Migralube*	lb.	——	.35
ML-1027-2C*	gal.	——	2.65
ML-1028-2C*	gal.	——	2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	——	1.90
Mold Lubricant No. 426* (d.ms.)	lb.	.18	.17
No. 735* (dms.)	gal.	——	1.25
No. 769* (dms.)	gal.	——	1.20
No. 825* (dms.)	gal.	——	2.00
No. 856* (dms.)	gal.	——	1.90
No. 880* (dms.)	gal.	——	1.19
No. 887* (dms.)	gal.	——	1.80
No. 935* (dms.)	gal.	——	1.56
No. 956* (dms.)	gal.	——	2.50
No. 965* (dms.)	gal.	——	2.15
No. 967* (dms.)	gal.	——	2.40
No. 969* (dms.)	gal.	——	1.50
No. 970* (dms.)	gal.	——	4.50
No. 975* (dms.)	gal.	——	2.85
No. 980* (dms.)	gal.	——	1.53
No. 987* (dms.)	gal.	——	2.45
A 187* (dms.)	gal.	——	1.90
A 256* (dms.)	gal.	——	1.20
A 988* (dms.)	gal.	——	2.60
Moldeze No. 3*	gal.	——	4.95
Mold-Brite*	gal.	——	1.50
Monopole Oil MD*	lb.	——	.16
MR-22 Silicone Semi-Permanent	gal.	9.95	14.95
Olate Flakes*	lb.	.23½	.24¾
Orvus WA Paste* (dms.)	lb.	——	.23¼
Plaskon Polyethylene S*	lb.	.32	.47
Poly-Brite PE-20	lb.	.28	.42
600	lb.	.42	.58
Poly-Cone 125X	lb.	1.15	1.30
1,000	lb.	.91	1.04
Polyglycol 15-200*	lb.	.25	.28¾
E4000*	lb.	.31	.37
Prodag*	lb.	.32	.60
Purity Flake* (dlvd.)	lb.	.14¾	.16½
Rubber-Flo*	gal.	1.25	2.00
Rubber-Glo*	gal.	——	.94
Rusco Mold Paste*	lb.	.25½	.32
Sericite* (l.c.l.)	ton	65.00	75.00
Silicone Oil A145*	lb.	3.22	3.61
A220* (dms.)	lb.	——	2.80
Silrex (dms.)	lb.	——	.65
Rubars*	lb.	——	.22¾
Soybean Lecithin	lb.	.13	.17
Thermalube*	lb.	——	.13¾
UC Silicone L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-45*	lb.	1.15	1.69
LE-450*	lb.	1.15	1.69
Ucon Lubricants*	lb.	.26¾	.27¾
Ulco Mold Soap*	lb.	.19	.29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2;			
NN-3	gal.	.12½	.20½
NN-4	gal.	.13½	.21½
114	gal.	.19	.27
4053	gal.	.21	.29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	——	.25
Extrud-o-Lube*	gal.	1.33	1.54
Ivory Chips*	lb.	.19¾	.20¾
LatexLube GR* (dlvd)	lb.	.19¾	.21½
No. 82-A* (450 lb. dms.)	lb.	——	.08½
Nopcowax 22-DS*	lb.	.38½	.41
Propylene Stearate (dms.)	lb.	.35	.60
Versa-Lube B*	lb.	.16	.18

LUBRICANTS, RUBBER SURFACE

Antidust	lb.	.37 -	.41
Barium Stearate	lb.	.41 -	.46
Calcium Stearate	lb.	.39 -	.44
Crown Brand*	lb.	.37 -	.42
D.C. 7 Compound*	lb.	4.70 -	5.80
D.C. 200 Fluid*	lb.	2.90 -	3.47
ELA*	lb.	— -	.82
G-E Silicone Fluid SF-92*	lb.	3.04 -	4.25
Glycerized Lubricant*	gal.	1.25 -	1.48
Glydag B*	lb.	1.60 -	2.25
Glyso-Lube* (dms.)	lb.	— -	.14
No. 3* (dms.)	lb.	— -	.14
Hydro-Zinc*	lb.	— -	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼ -	.19¼
R-66*	lb.	— -	.17½
Liqui-Lube* (dlvd.)	lb.	— -	.17¾
N.F.* (dlvd.)	lb.	— -	.17¾
N.T.* (dlvd.)	lb.	— -	.16¾
Lubrex*	lb.	.27 -	.32
Lubri-Cote	gal.	.86 -	1.00
Magnesium Stearate	lb.	.42 -	.47
Crown Brand*	lb.	.40 -	.45
Polyethylene Glycol	lb.	.22 -	.26
Rexanol*	lb.	— -	.13
Rubber Free (Concentrate)*	gal.	— -	1.44
Jel*	lb.	.18 -	.21½
Separex*	lb.	.08½ -	.10½
Slab-Dip* (dms.)	lb.	— -	.17
Soybean Lecithin	lb.	.13 -	.17
Stock-Lube*	lb.	— -	.19
UC L-45*	lb.	2.90 -	4.61
L-522*	lb.	2.68 -	3.50
LE-450*	lb.	1.15 -	1.69
XL-42*	lb.	3.10 -	4.75
XLE-42*	lb.	1.22 -	1.70
XLE-420*	lb.	1.18 -	1.70
Wet Zinc*	lb.	— -	.22¼
CW*, P*	lb.	— -	.20
Zinc Stearate	lb.	.41 -	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45 -	1.65
Alkon* (dlvd.)	lb.	.16 -	.16½
CA-301*	gal.	— -	2.49
CA-302*	gal.	— -	2.63
G-O 6910*	lb.	.38 -	.40
Metso Anhydrous*	cwt.	5.70 -	7.95
Metso 99*	cwt.	5.00 -	7.25
200*	cwt.	6.70 -	8.95
Granular*	cwt.	4.45 -	6.70
Orvus Extra Granules*	lb.	.23¼ -	.24¾
Polo*	lb.	.12¾ -	—
Rubber-Sol*	gal.	2.97 -	3.97
Shelblast*	lb.	.04 -	.08¼
Sprex A.C.* (dlvd.)	lb.	.17¾ -	.18¾
Zip Mold Cleaner*	gal.	1.05 -	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95 -	1.25
Pepton 22 Plasticizer*	lb.	.83 -	.86
65*	lb.	1.23 -	1.26
65B*	lb.	.83 -	.86
Pitt-Consol 640 (dms.)	lb.	— -	.42
646 (dms.)	lb.	— -	.52
RPA 2*	lb.	— -	.85
3*	lb.	— -	.51
3 Conc.*	lb.	— -	.85
6*	lb.	— -	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26 -	.27
Acto 500*	lb.	— -	.95
Adipol BCA*	lb.	47 -	.47½
2EH*	lb.	.38½ -	.40
10A*	lb.	.38½ -	.40
ODY*	lb.	.38½ -	.40
810*	lb.	.42½ -	.43½
XX*	lb.	.38½ -	.40
Admex 562 (dms.)	lb.	.50¾ -	.51¼
710 (dms.)	lb.	.35¾ -	.36¼
711 (dms.)	lb.	.37¾ -	.38¼
744 & 745 (dms.)	lb.	.41¾ -	.42¼
760 (dms.)	lb.	.59¾ -	.60¼
761 (dms.)	lb.	.46¾ -	.47¼
770 (dms.)	lb.	.42¼ -	.43
Anhydrol 6990*	lb.	.51 -	.56
Arneel SD*	lb.	.34 -	.40
Arolene 1980* (c.l.)	lb.	— -	.16
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08 -	.08½
Aromatic Tar	gal.	.0573 -	.1973
Bardol*	lb.	.02¾ -	.03¾
B*	lb.	.06¼ -	.06½
Bayol D*	gal.	— -	.382
F*	gal.	— -	.52
Bearflex 1751*	lb.	.14 -	.15
LPO*	lb.	.03 -	.04
MPO*	lb.	.03¾ -	.04¾
Beeswax, Bleached	lb.	73 -	.75
Yellow Refined	lb.	.64 -	.65
Bondogen*	lb.	.55½ -	.60½
B.R.C. No. 20*	lb.	.0150 -	.0175
No. 21*	lb.	.02¾ -	.03
No. 22*	lb.	.02½ -	.02¾
B.R.H. 2*	lb.	.0213 -	.0351
BRS 700*	lb.	.0200 -	.0285
B.R.T. 3*	lb.	.0180 -	.0265
4*	lb.	.0250 -	.0260
7*	lb.	.0300 -	.0310

PLASTICIZERS & SOFTENERS (Cont'd)

B.R.V.*	lb.	.0475 -	.0565
Bunarex Resins*	lb.	.07 -	.08
Bunatak AH*	lb.	— -	.09½
N*	lb.	— -	.31
U*	lb.	— -	.17½
No. 90*	lb.	— -	.09
No. 210*	lb.	— -	.14
Butac*	lb.	.1735 -	.1835
Butyl Carbitol Periargonate (dms.)	lb.	— -	.64½
Butyl Cellosolve Periargonate (dms.)	lb.	— -	.68
Butyl Oleate	lb.	.26 -	.27
Butyl Palmitate	lb.	— -	.26½
Butyl Stearate (dms.)	lb.	.26 -	.27
Byerflux*	gal.	.28½ -	.29½
Cauliflux 510* (and 550*)	lb.	.02¾ -	.03¾
G.P.*	lb.	.01½ -	.02½
R-100*	lb.	.04¾ -	.05¾
LBL*	gal.	.17 -	.25
OSR*	lb.	.01⅞ -	—
RC*	gal.	.13½ -	.21½
TT*	lb.	.0195 -	.0295
Candelilla Wax, Prime	lb.	.53 -	.64
Refined Light	lb.	.56 -	.60
Carbowax 4000* (dms.)	lb.	.68 -	.70
Cardolite NC-103*	lb.	.36 -	.59
Carnauba Wax, Crude	lb.	.73 -	.74
Flaked	lb.	.73 -	1.25
Refined, Technical	lb.	.73 -	.74
Refined, Pure	lb.	.82 -	.86
Yellow	lb.	1.10 -	1.15
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	— -	.32½
179-A* (t.c., dlvd.)	lb.	— -	.32½
179-C* (t.c., dlvd.)	lb.	— -	.32½
179-EG* (t.c., dlvd.)	lb.	— -	.32½
DBP* (t.c., dlvd.)	lb.	— -	.30
DOP* (t.c., dlvd.)	lb.	— -	.28½
TPP* (dms., eqld.)	lb.	— -	.40
Ceresin Wax	lb.	.12 -	.30
Chlorowax 40*	lb.	.15 -	.17½
50*	lb.	.16 -	.18½
70*	lb.	.18½ -	.20
LV*	lb.	.17 -	.19½
CTLA Polymer*	gal.	.20 -	.36
Cumar Resins*	lb.	.07 -	.19
Cyclolube OSR*	gal.	.28 -	.36
Darex DBM*	lb.	.30½ -	.34
DBP*	lb.	.30 -	.33½
DOP*	lb.	.30½ -	.33½
DIOP*	lb.	.30½ -	.33½
D.B.M.*	lb.	.32 -	.34¾
Decylbutyl Phthalate	lb.	.27 -	.29½
Degras, Common	lb.	— -	.14
Diallyl Phthalate	lb.	.51½ -	.52½
Dibenzyl Sebacate (dms.)	lb.	.93 -	.93½
Dibutoxyethyl Sebacate	lb.	— -	.61½
Dibutyl Phthalate (dms.)	lb.	.31½ -	.33
Dibutyl Sebacate	lb.	.67½ -	.68
Dicapryl Adipate (dms.)	lb.	.41½ -	.42½
Dicapryl Phthalate (dms.)	lb.	.27½ -	.29
Dicapryl Sebacate	lb.	.58 -	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50½ -	.51
Dicyclohexyl Phthalate	lb.	.45 -	.46½
Diethyl Phthalate (dms.)	lb.	.29¾ -	.31¼
Di-2-ethylhexyl Phthalate (dms.)	lb.	.29 -	.30½
Dihexyl Adipate (dms.)	lb.	.46½ -	.47
Dihexyl Phthalate (dms.)	lb.	.32½ -	.33½
Dihexyl Sebacate (dms.)	lb.	.66 -	.66½
Diisooctyl Azelate	lb.	— -	.47
Diisobutyl Phthalate	lb.	.30 -	.31½
Di-iso-octyl Adipate	lb.	.42½ -	.43½
Dimethyl Phthalate (dms.)	lb.	.29¾ -	.31¼
Dimethyl Sebacate (dms.)	lb.	1.30 -	1.30½
Dinonyl Adipate	lb.	.44 -	.47
Dinopol IDO*	lb.	.27½ -	.29
MOP*	lb.	.28½ -	.30
Dioctyl Adipate (dms.)	lb.	.42½ -	.43½
Dioctyl Phthalate (dms.)	lb.	.27 -	.28½
Dioctyl Sebacate (dms.)	lb.	.61¼ -	.62¼
D.I.O.P. (dms.)	lb.	.28½ -	.30
Dipolymer Oil	gal.	.33 -	.48
Dispersing Oil No. 10*	lb.	.06 -	.06¼
Durrex* 1, 6, 7	gal.	.18 -	.23
6H	gal.	.13 -	—
15E	gal.	.11 -	.23
20, 25	lb.	.03 -	.06
33	gal.	.21 -	.33
DX-111	lb.	.13¼ -	.14¼
DX-111 NS	lb.	.14¼ -	.15¼
DX-40	lb.	.14¾ -	.15¾
Elastex 10-P*	lb.	.30½ -	.33½
50-B*	lb.	.25 -	.28
DCHP*	lb.	.59 -	.60
Emulphor EL-719*	lb.	— -	.58
Epoxy Plasticizer	lb.	.33½ -	.36
Drapex 3.2*	lb.	.39¼ -	.40¼
Drapex 4.4*	lb.	.34¾ -	.35¾
Drapex 7.7*	lb.	.37 -	.38
Esparto Wax	lb.	— -	.55
Estac*	lb.	— -	.16
Facile Gum 4A*	lb.	.48 -	.50
Flexol B-400*	lb.	.29 -	.30
DOP*	lb.	.29 -	.30½
TOF*	lb.	.47 -	.48
3GH*	lb.	— -	.46¾
3GO*	lb.	— -	.55¾
4GO*	lb.	— -	.36½
426*	lb.	.28½ -	.30
Flexricin P-1*	lb.	.33½ -	.36½
P-4*	lb.	.30½ -	.33¼
P-6*	lb.	.37 -	.40
P-8*	lb.	.30¼ -	.33¼

PLASTICIZERS & SOFTENERS (Cont'd)

Fortex A* (dms.)	lb.	.12½ -	.14½
Fura-Tone NC-1008*	lb.	.28 -	.39
Galex W-100*	lb.	.15½ -	.19¾
Good-rite GP233*	lb.	.40 -	.43½
GP235*; GP236*	lb.	.40 -	.43½
GP261*	lb.	.28 -	.31½
GP265*	lb.	.28½ -	.32
GP266*	lb.	.29 -	.32½
GP-266-BPA*	lb.	.29 -	.32½
Hallco C-255-NS*	gal.	.27½ -	.29½
C-566*	lb.	.11 -	.13
Harflex 300* (dms.)	lb.	.60½ -	.61
325* (dms.)	lb.	.45 -	.45½
330* (dms.)	lb.	.46¼ -	.46¾
375* (dms.)	lb.	.76 -	.76½
HB20*	lb.	.17 -	.18½
HB40*	lb.	.21½ -	.23
Herron-H.T.*	gal.	.16 -	.27
Herron-Plas*	lb.	— -	.03¾
Herron-Wax*	lb.	.05¼ -	.06
No. 23*	lb.	.08¼ -	.08¾
No. 24*	lb.	.07¼ -	.07¾
HSC No. 13*	lb.	.25 -	.32
No. 39*	lb.	.22 -	.29
Indonex W-2*	gal.	.12 -	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28 -	.29½
K-stay*	lb.	.12 -	.13
Kapsol*	lb.	.35 -	.35½
Kenflex A & N*	lb.	.19 -	.34
Kesscoflex BCL* (dms.)	lb.	— -	.37
BCO* (dms.)	lb.	— -	.33
BCP* (dms.)	lb.	— -	.36
BCS* (dms.)	lb.	— -	.32
BO* (dms.)	lb.	— -	.28¼
BS* (dms.)	lb.	— -	.27½
DBT* (dms.)	lb.	— -	.68
DIOA* (dms.)	lb.	— -	.43½
DOA* (dms.)	lb.	— -	.43½
MCO* (dms.)	lb.	— -	.35½
MCP* (dms.)	lb.	— -	.41
MCS* (dms.)	lb.	— -	.35
TRA* (dms.)	lb.	— -	.40
KP 20*	lb.	.27 -	.28½
23*	lb.	.32½ -	.33½
90*	lb.	.42½ -	.44
140*	lb.	.48 -	.48½
201*	lb.	.46½ -	.48
260*	lb.	.35½ -	.37
Kremol 40*	gal.	.36 -	.36
56*	gal.	.39 -	.39
Kronisol* (dms.)	lb.	.38 -	.39
Kronitex AA* (dms.)	lb.	.35 -	.36
1, K-3, MX*	lb.	.35 -	.36
Lanolin, Tech. Anhydrous	lb.	— -	.26
Latex-Lube G.R.*	lb.	.19¼ -	.20
Lead Oleate	lb.	— -	.29¼
Lindol* (dms., t.c.)	lb.	— -	.32½
Locusol No. 1-6980*	lb.	.30 -	.34
2-Mercaptoethanol (dms.)	lb.	1.25 -	1.50
Methox*	lb.	.42 -	.43
Methyl Laurate	lb.	.25 -	.27
Methyl Oleate	lb.	— -	.20
Methyl Stearate (dms.)	lb.	— -	.30
Monoplex DOS*	lb.	.59½ -	.60½
DBS*	lb.	.65½ -	.66½
S-70*	lb.	.41 -	.42
S-71*	lb.	.46½ -	.47½
Montan Wax, Crude	lb.	.21 -	.26
Flaked	lb.	.29 -	.29
Morflex*	lb.	.32 -	.69½
Natac*	lb.	.1685 -	.1785
Nebony Resins* (dms.)	lb.	.04½ -	.05½
Neolene 210* (t.c.)	lb.	— -	.16
212* (t.c.)	lb.	— -	.14
220* (t.c.)	lb.	— -	.15
Nerium*	lb.	— -	.09
Nevillac Resins* (dms.)	lb.	.31 -	.85
Neville LX-880* (dms.)	lb.	.12 -	.13½
LX-685* (dms.)	lb.	.12 -	.17½
LX-782 (dms.)	lb.	.07½ -	.08½
LX-828* (dms.)	lb.	.11 -	.12½
LX-1000* (dms.)	lb.	.12 -	.13
Neville Resins* (dms.)	lb.	.07¼ -	.20
Nevindene Resins* (dms.)	lb.	.16½ -	.20
Nevinol* (dms.)	lb.	— -	.24
No. 480 Oil Proof Resin*	lb.	— -	.18
Ohopex Q10* (dms.)	lb.	.28½ -	.30
R9* (dms.)	lb.	.37¼ -	.37¾
OPD*	lb.	.29 -	.40
Ortho-Nitrobiphenyl	lb.	.13 -	.15
Ozokerite Wax, White and Yellow	lb.	.21 -	.31
Panaflex BN-1*	lb.	.18 -	.22¼
Panarez 3-210	lb.	.12½ -	.14
6-210	lb.	.12 -	.13½
12-210	lb.	.11½ -	.13
Paradene Resins (dms.)	lb.	.07¼ -	.08
No. 2 Flaked	lb.	.08 -	.08½
Para Flux* (dms.)	gal.	.22 -	.25
2016* (dms.)	gal.	.22 -	.26
Para Lube* (c.l.)	lb.	.046 -	.048
Paraplex G-25*	lb.	.76 -	.77
G-40*	lb.	.50 -	.51
G-50*	lb.	.40¾ -	.41¾
G-53*	lb.	.45 -	.46
G-60* (and G-61*)	lb.	.32¼ -	.32¼
G-62*	lb.	.33¾ -	.33¾
Parmo*	lb.	.06 -	.13½
Peroxidol 780*	lb.	.33¼ -	.36¼
781*	lb.	.34¾ -	.37¾
Petroflux MV*	gal.	.097 -	.177
Petrolatum (dms.)	lb.	.04¼ -	.14¾

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	——	.35
Philrich-5* (t.c.)	gal.	——	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.1200	.1360
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentarol*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	——	.09¼
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	——	.26½
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¼
Plastoflex 3*	lb.	——	.52
52*	lb.	.37¾	.38¼
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¼
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.29
332*	lb.	.42½	.44
562*	lb.	.28	.29½
662*	lb.	.28½	.30
532 and 632*	lb.	.42½	.44
ED*	lb.	——	.45
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	——	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0440	.0630
PX-5	lb.	.21½	.22½
PX-7	lb.	.24	.25
PX-104* (dms.)	lb.	.31½	.33
PX-108* (dms.)	lb.	.27	.28½
PX-138* (dms.)	lb.	.27	.28½
PX-208* & 238* (dms.)	lb.	.38½	.39½
PX-404* (dms.)	lb.	.67½	.68½
PX-438* (dms.)	lb.	.59	.60
PX-800* (dms.)	lb.	.35¼	.36¼
PX-917* (dms.)	lb.	.35	.36
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17½	.18½
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rextlex*	lb.	——	.15
Rosin Oil	gal.	.80	1.35
RR 10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¼
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	——	.28½
No. 603*	lb.	.27	——
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
EXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	——	16
Tar, Refined	gal.	.1200	.1760
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	——	.65
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¾
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1560	.1660
Turgum SB*	lb.	.10½	.11½
Turpol NC-1200*	lb.	.67	.70
NC-1300*	lb.	——	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33½
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.25½	.26½
Refined (dms.)	lb.	——	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	——	.82
Foamnix*	lb.	.60	1.50
Hydrofol Glycerides 200*	lb.	.15½	.19¾
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	——	.27
Millrex*	lb.	——	.15
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	——	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	——	.23
Aroostoocrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Modicol VD*	lb.	.13½	.15⅞
Prosein*	lb.	——	.06
Stablex B*	lb.	.50	.95
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb	.05	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	5.20
Liquid 50% (t.c.)	cwt.	——	2.90
Solid 76% (c.l., dms.)	cwt.	——	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	31.00
(94-97%)	ton	——	39.80
Gensol No. 6* (t.c.)	gal.	——	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07¾
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	——	.42
Pitt-Consol 500 (dms.)	lb.	.25	.25½
500 NS* (dms.)	lb.	.33	.33½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
Q Oil* (t.c.)	gal.	——	.286
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.51
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Dixiedensed (and S)*	lb.	.0775	.1550
Kosmobile (and S)*	lb.	.0775	.1550

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Dixiedensed HR (and S-66)	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Dixiedensed 77*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1350	.2200
Dixie Voltex*	lb.	.2600	.3500
Kosmink Dustless*	lb.	.1350	.2200
Kosmos Voltex	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Dixie CF*	lb.	.0925	.1600
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Aromax SAF	lb.	.1150	.1825
Dixie 85	lb.	.1150	.1750
Kosmos 85	lb.	.1150	.1900
Philblack E*	lb.	.1150	.1900
Statex 160*	lb.	.1150	.1900
Vulcan 9*	lb.	.1150	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	.1600
Continex 1SAF*	lb.	.0925	.1600
Dixie 70*	lb.	.0925	.1600
Kosmos 70*	lb.	.0925	.1600
Philblack I*	lb.	.0925	.1600
Statex 125*	lb.	.0925	.1600
Vulcan 6*	lb.	.0925	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150	.1800
Vulcan SC*	lb.	.1800	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	—	.0625
Sterling FT (c.l.)	lb.	—	.0625

Thermal, Medium (MT) (bags)

Shellblack*(††)	lb.	—	**.0250**
Sterling MT (c.l.)	lb.	—	.0450
MT Non-Staining (c.l.)*	lb.	—	.0550
Thermax (c.l.)*	lb.	—	.0450
Stainless (c.l.)	lb.	—	.0550

Specialty Blacks (Awaiting Classification)

Neotex 100*	lb.	.0775	.1450
Neotex 130*	lb.	.0925	.1600
Neotex 150*	lb.	.1150	.1900
Regal 300*	lb.	.0775	.1450
Regal 600*	lb.	.0925	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66	1.25
D. C. Silica (pelletized)*	lb.	1.45	1.65
Hi-Sil 233*	lb.	.08¼	.09¾
X303*	lb.	.50	.60
Santocel*	lb.	.62	.64
Ultrasil VN-3*	lb.	.35	.65
Valron Estersil*	lb.	2.00	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40	.50
Cato 2* (100 lb. bag)	lb.	17.00	—
Darex Copolymer No. 3*	lb.	.47	.49
43G*	lb.	.39	.41
Darex Copolymer Latex No. 3-L	lb.	.41½	.46
Durez 12687 (and 12707)*	lb.	.36½	.40
Durez 13355*	lb.	.27½	.31½
Dymerex Resin	lb.	.15¾	.17
Good-rite Resin 2007*	lb.	.36	.38
2057*	lb.	.30	.31
Hystron*	lb.	.39	.41
Kralac A-EP*	lb.	.39	.41
Lampblack	lb.	—	.12
Marbon 8000*	lb.	.36	.43
Marmix*	lb.	.35	.43
Mistron Vapor*	lb.	—	.03½
HGO-55*	lb.	—	.05
Pliolite Latex 150*	lb.	.35	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33	.57
Pliolite NR*	lb.	.93	.95
S6B*	lb.	.36	.43
Polyco 220*	lb.	.18¼	.19¼
Poly-Phen 201-C; 218-C	lb.	.27½	.29
202-C	lb.	.36	.37½
Polypol S-70*	lb.	.25	.26

RETARDERS

Akron Benzoic Acid TBAO-2*	lb.	.41	.43
Dutch Boy Normasal*	lb.	—	.46
ESEN*	lb.	.39	.41
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.68	.70
PD*	lb.	.39	.41
W*	lb.	—	.46
Retardex*	lb.	.46	.46
TCM-25*	lb.	.60	.70
Wiltrol P	lb.	.37	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00	62.00
Hard Hydrocarbon Solid (dms.)	lb.	.03	.06
Granular (bags)	lb.	.03¼	.06¼
Herron Flake*	ton	—	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	.33½	.36
Neophax*	lb.	.17	.27
Car-Bel-Rex A and C*	lb.	—	.126
White	lb.	.15	.26
670 Brown	lb.	.14¼	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	—	**.62**
No. 1198*	lb.	.46¾	.49¾
Tysonite*	lb.	.30	.30¾

SOLVENTS

Acetone (dlvd.)	lb.	.10½	.12
Amaco Lactol Spirits* (t.c.)	gal.	—	.20
Naphthol Spirits*	gal.	—	.19
Mineral Spirits*	gal.	—	.18
Rubber Solvent* (t.c.)	gal.	—	.19
Solv A* (t.c.)	gal.	—	.22
Solv A-80* (t.c.)	gal.	—	.23½
Solv B* (t.c)	gal.	—	.28
Solv B-90* (t.c.)	gal.	—	.31
Solv D* (t.c.)	gal.	—	**.30**
Solv E*	gal.	—	**.30**
Solv F*	gal.	—	**.30**
Solv F-80*	gal.	—	.32
Solv G*	gal.	—	.36
Special Naphtholite* (t.c.)	gal.	—	.19
Special Textile Spirits*	gal.	—	.20
Super Hi-Flash Naphtha*	gal.	—	**.34**
Super Naphtholite*	gal.	—	.19
Textile Spirits* (t.c.)	gal.	—	.20
Amyl Chlorides, Mixed (l.c.l.) (dms.)	lb.	—	.11
Bensol 90%	gal.	**.36**	**.40**
Butyl Acetate	lb.	.17	.18½
Butyl Alcohol	lb.	.17	.19½
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.07	.08½
Carbon Tetrachloride	lb.	.10¾	**.14¼**
Cesol 1*	gal.	**.37**	**.43**
2*	gal.	**.42**	**.48**
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	—	.56
Cyclohexanone	lb.	.31	.34½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	—	.06
Dicom*	gal.	—	.55
Halowax Oil*	lb.	**.28**	**.41**
Heptanes* (t.c.)	gal.	—	.1609
Hexanes (t.c.)	gal.	—	.1584
Isobutyl Acetate	lb.	.15¼	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	**.43**	**.79**
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	—	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	—	.12½
N-5 Pentane Mix* (t.c.)	gal.	—	.13½
N-6 Hexanes* (t.c.)	gal.	—	.14½
N-7 Hexanes* (t.c.)	gal.	—	.13½
Nelio Dipentene	gal.	.41	.62
Penetrell*	gal.	.41	.42
Perchlorethylene	lb.	11¾	.15¼
Petrolene* (t.c.)	gal.	—	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	—	.11¾
Alcohol (t.c., dlvd.)	lb.	—	.11
Pyridine, Refined	lb.	.69½	.70
Quinoline	lb.	.50¾	.51¼
Rubber Solvent (t.c.)	gal.	—	.16
Rubsol (t.c.)	gal.	—	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	—	.16
C (Heptanes)* (t.c.)	gal.	—	.1614
R (Rubber Solvent)*	gal.	—	.1390
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	—
Sunny South DD Dipentine*	gal.	.41	.62
Sunny South DD Pine Oil*	lb.	—	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	—	.38
Toluol (t.c.)	gal.	.25	.25
Trichlorethane	lb.	—	.12¾
Trichlorethylene	lb.	.12	.16¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	—	.174
5* (dms.)	gal.	—	.199
7* (t.c.)	gal.	—	.164
2-50 W Hi-Flash*	gal.	—	.41
Xylol (t.c.)	gal.	.29	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.95
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*; CH-201*	lb.	.60	.65
E-82*	lb.	90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amioca 50* 85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.65	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16½	.17½
Cadmium Ricinoleate	lb.	—	**2.00**
Calcium Ricinoleate	lb.	—	**.55**
Dutch Boy DS-207*	lb.	—	**.54**
B*	lb.	—	.32½
Tribase*	lb.	—	.27½
Dythal*	lb.	—	**.39½**
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	—	**.98**
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.68	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-8*	lb.	1.31	1.33
3-V-1*	lb.	.41	.45
6-V-1B*	lb.	—	.55
6-V-2*	lb.	.62	.72
6-V-6*	lb.	.62	.72
6-V-10*	lb.	.62	.72
7-V-2*	lb.	1.00	1.10
8-V-1*	lb.	.89	.99
8-V-100*	lb.	.89	.99
9-V-1*	lb.	.77	.87
12-V-5*	lb.	.73	.75
24-V-1*	lb.	1.10	1.14
128-V-5*	lb.	.86	.88
Istabelan **No. 115 Liquid**	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Kosol* (50 lb. bags)	lb.	19.00	—
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
LL*	lb.	.59	.62
KCB*	lb.	.59	.62
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XI*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
33*; 34*; 35*	lb.	.97	1.00
Metasap 613-A*	lb.	—	**.69**
613-B*	lb.	—	**.84**
613-C*	lb.	—	**1.06**
621*	lb.	—	**.88**
624*	lb.	—	.75
633*	lb.	—	.75
635*	lb.	—	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nonisol 100	lb.	.38	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20	2.30
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	—	.70
E6B*	lb.	—	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	—	.60
OM-10*	lb.	—	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	—	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*; 90*	lb.	.70	.72
95*	lb.	.70	.72
229*	lb.	.61	.63

STABILIZING AGENTS (Cont'd)

Vanstay AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	1.02	1.05
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
HTF* (dms.)	lb.	.77	.80
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR*; RRZ* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.66	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	——	1.85
Processinfi Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	——	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	——	1.67
Ross Sunproofing Waxes*	lb	——	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	——	.81
G*	lb.	——	.21
MDL*	lb.	——	.33
ME*	lb.	——	.82
NS*	lb.	——	.60
SMO*	lb.	——	.50
WAQ*	lb.	——	.22
Emulphor EL-620*	lb.	——	.40
EL-719*	lb.	——	.58
ON-870*	lb.	——	.55
Hyonics*	lb.	——	.28¾
Igepal CA-630	lb.	——	.26
CO-630; CO-730*	lb.	——	.29
CO-850; CO-880*	lb.	——	.29
Igepon CN-42*	lb.	——	.25
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
T-77*	lb.	——	.49
Kessco 50201*	lb.	——	.44½
50203*	lb.	——	.44¼
18201*	lb.	——	.32
18203*	lb.	——	.35½
Lipal 9-N.* 11-0*	lb.	.28	.29
8-0.* 6-0*	lb.	.29	.30
25C.* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Phosphonol 0* (dms.)	lb.	.40	.41
H* (dms.)	lb.	.80	.81
N* (dms.)	lb.	.50	.51
T* (dms.)	lb.	.60	.61
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb	——	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arcco A-2t*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	——	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	——	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	——	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	——
Resin V	lb.	——	.23½
Synthol* (dms.)	lb.	.26	.30¼
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	——	.45
Zirex* (c.l.)	cwt.	——	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	——	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	——
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	——
Melojel* (100 lb. bags)	lb.	6.71	——
Modicol VD*	lb.	.13⅜	.15⅞
VE*	lb.	.13⅞	.16⅜
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	——

Selenium

Vandex*	lb.	——	6.50
VA-7*	lb.	——	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	——	2.90
Cloud* (c.l.)	cwt.	——	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16
Devil A* (c.l.)	cwt.	——	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	——	.39
Mist* (Wettable) (c.l.)	cwt.	——	4.05
Spider* (c.l.)	cwt.	——	2.85
Star* (c.l.)	cwt.	——	4.90
Sulfasan R*	lb.	——	1.55
Tire* (c.l.)	cwt.	——	2.45
Tube* (c.l.)	cwt.	——	4.90
Vultac 2*	lb.	.47	.74
3*	lb.	.51	.78

Tellurium

Telloy*	lb.	——	5.00

WETTING AGENTS

Advawet No. 10*	lb.	——	.17
No. 33*	lb.	——	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	——	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	——	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Hyonic PE-90*	lb.	.25	.27
PE-100*	lb.	.25	.27
Kessco E-122* (dms.)	lb.	——	.45
18201*	lb.	——	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	——	.29¼
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nacconol A* (dlvd.)	lb.	——	.52
NRSF* (dlvd.)	lb.	.40½	.45
SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nekal WS-25	lb.	——	.38
WS 99	lb.	——	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	——	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3 Paste*	lb.	.26	.30
Sorapon SF-73*	lb.	——	.18
SF-78*	lb.	——	.30
Sorbit P*	lb.	.29	.31
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	——	.15
Vultamol*	lb.	——	.17½
Wetsit Conc.*	lb.	.35	.35

MISCELLANEOUS CHEMICALS

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Copper Inhibitor No. 50*	lb.	——	1.20
D-Tac*	lb.	——	.22
Elastopar	lb.	2.05	2.07
2-Ethyl Hexanol	lb.	.23¾	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates*	lb.	.75	4.50
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	——
Resorcin, Tech.	lb.	.77½	.81¾
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	——	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
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			1	2	3	4
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26	27	28				

1961 MARCH 1961

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1961 APRIL 1961

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1961 MAY 1961

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1961 JUNE 1961

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1961 JULY 1961

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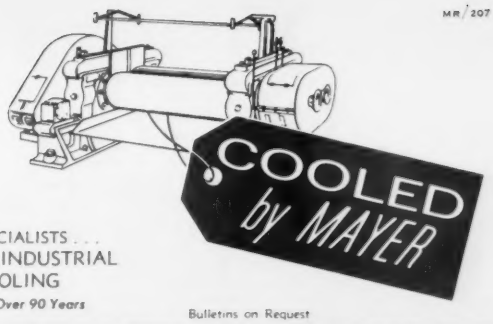

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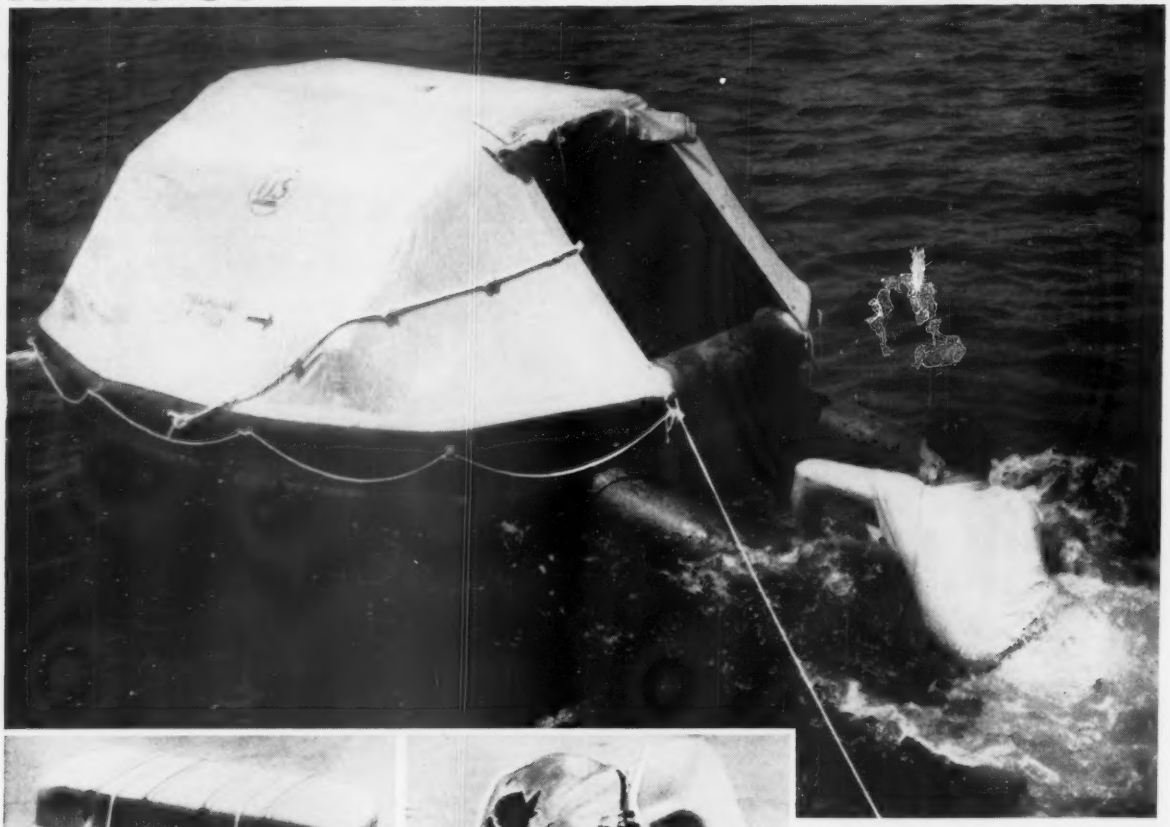

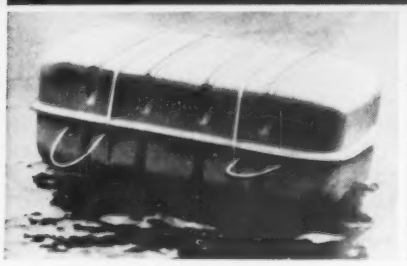

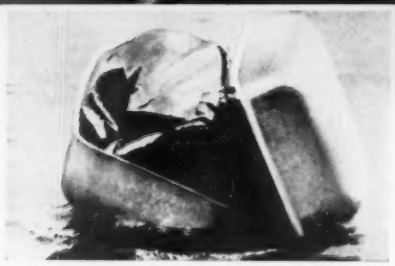

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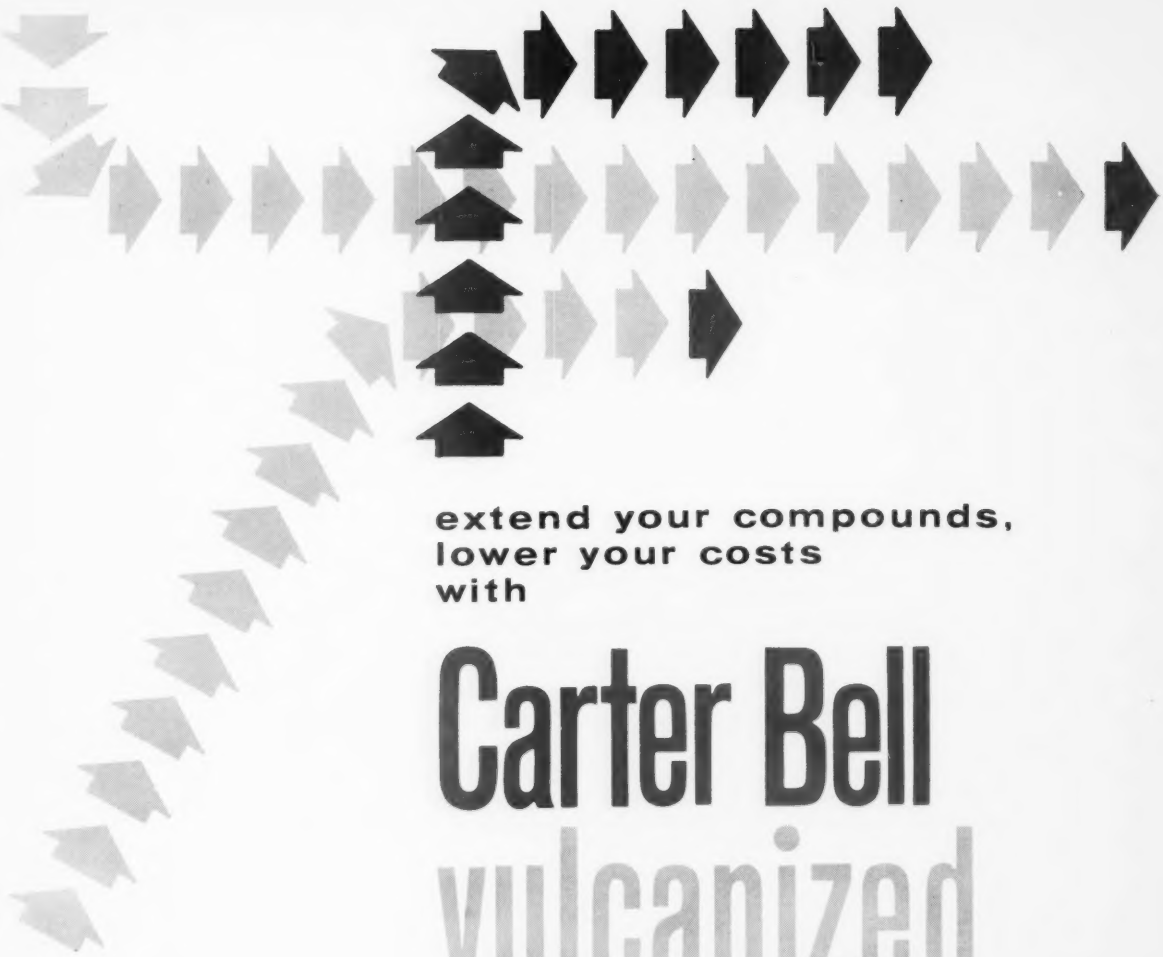

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JULY, 1961

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